

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XIX: No. 3.

New York, Thursday, January 18, 1877.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

Hopkins' Lead Facing for Journal Bearings.

Probably one of the most fruitful causes of heating of journals from want of lubrication is the fact that they do not fit, the pressure coming heavily upon one portion of the bearing, and leaving another part without any. Upon railway cars, owing to the methods employed in setting up trucks and fitting the parts, hot boxes are usually expected when a car first goes out of the shop until the journals and brasses have worn themselves down to a bearing. We have examined a great many brasses where the weight was really taken on a surface of only three or four square inches, instead of fifteen or more, according to the size of the brass employed. Under such conditions the wonder is, not that boxes get hot, but that they ever run cool. The improvement which Mr. Hopkins has patented is the lining of journal boxes with a thin film of lead. The metal is so soft that almost from the pressure alone the journal beds itself throughout its whole length. Though lead has never been considered a peculiarly valuable metal for a bearing, yet it is found that under these circumstances it displays a remarkable degree of durability. We have seen brasses which had run upward of 30,000 miles without wearing through a film of soft lead, which was at first only 1-16th of an inch in thickness. In this case the journal was polished to a brilliancy equal to that of a mirror, every opening or grain in the iron having been completely filled up. When the wear is continued till the lead is worn through the brass itself takes a polish of most extraordinary fineness, resulting from the filling of the pores of the metal, apparently by the worn particles, which seem to be cemented in their places by means of the lead.

Messrs. Geo. R. Meneely & Co., of West Troy, New York, the well known bell founders, have for some time past been making a bronze journal bearing which shows a very great endurance, and while it wears the journal very little produces very little friction. These journal brasses after being turned and fitted are placed upon a mandrel and a lead lining cast in them, as shown in Figure 1. This insures a fit between the journal and brass just as soon as they come together. For example, take such a journal as that shown in Fig. 2, which is worn small in the center, if a new and hard brass were put upon it the bearing would be at or near the collars only, and heating would be inevitable until the bearing and journal had worn to fit. With the lead lining the bearing and journal fit at once, and there is no danger from heating. We have known of bearings which had been cutting to such an extent that great grooves had worn in them, made to run cool by filling up the grooves with strips of lead till a surface was obtained, and then putting on the brass.

The following is an official report of the comparative wear of journal bearings upon the Boston and Albany Railroad, as ascertained from tests made during the last year. It was presented at the Annual Convention of Master Car Builders, held in New York, June 15 and 16, 1876, and forms part of the minutes of its proceedings:

	Babbitt.	Lead Lined.
Number of bearings taken out.....	16	16
Total weight of bearings put in.....	153 lbs., 15½ oz.	161 lbs., 3¼ oz.
Total miles run.....	422,634	922,693
Total worth of bearings put in.....	\$36.95 (24c. per lb.)	\$48.35 (30c. per lb.)
Total weight of bearings when taken out.....	102 lbs., 10½ oz.	104 lbs., 13¼ oz.
Total weight lost.....	51 lbs., 5 oz.	56 lbs., 5 oz.
Average No. of miles run per oz. worn out.....	514	1,064
Total worth of bearings when taken out.....	\$13.37	\$30.93
Cost of running.....	\$35.58	\$37.42
Cost per 1,000 miles.....	5.58 cts.	3.97 cts.
Per cent. saved by using lead lined, 47.		

The advantages of the lead lining and bronze bearings are by no means confined to use upon railway rolling stock, although most of the experiments made to test their value have been made upon cars. They are of even more value upon lines of shafting, on steamers, and in similar situations, where heating and trouble with bearings are likely to occur.

The Tucuman Railway in the Argentine Republic has been recently completed. It is the longest railway in South America, and was finished in four years. The contract was signed September 28th, 1872, and the line was completed September 28th, 1876; Mr. Telfener, the contractor, has accordingly become entitled to a premium of £20,000. The line has cost only \$4750 per mile, and is the cheapest yet constructed in the Argentine Republic; its length being 306 miles, the total expenditure which it has involved has been £1,600,000.

Hardick's Improved Direct-Acting Steam Pump.

The pump we illustrate was designed to meet various requirements of service not usually regarded by manufacturers. Among the advantages claimed for it by the manufacturer are, that it is, so far as consistent with durability, cast in separate parts, so that in case of accident or breakage, the immediate part affected need only be replaced, as its cylinders are separate from bed-plate, water valve chest, discharge and air chamber; each being separate, is an important item of economy in severe climates, where, by the action of frost, all metal vessels are liable to fracture. The valve

at Paris in 1878 would be likely to prove a serious blow to British industries.

Mr. Bell's New Iron Rail.

We present below, from English journals of late date, two statements of interest concerning the probable result of the experiments now being conducted in the North of England, looking to the production of an iron rail that will equal a Bessemer steel rail in durability and other desirable qualities:

The Stockton Mercury is rather jubilant at what it terms an "important discovery in iron manufacture." "We learn," says our contemporary, "on the best authority, that the

invention, that it will fulfill all the hopes which are formed of it—a fact of the very greatest importance to the railway interest and the iron trade generally, more especially the rail trade of Cleveland."

The Railway News has the following: "A paragraph has been going the round of the papers containing statements which, if borne out by the actual results, would be of considerable importance to railway companies. The paragraph referred to states that Mr. I. Lowthian Bell has, at the instance of the North-eastern Railway, completed a number of experiments, and has satisfied himself that Cleveland iron can by his process be treated so as to make it equal in point of durability to steel

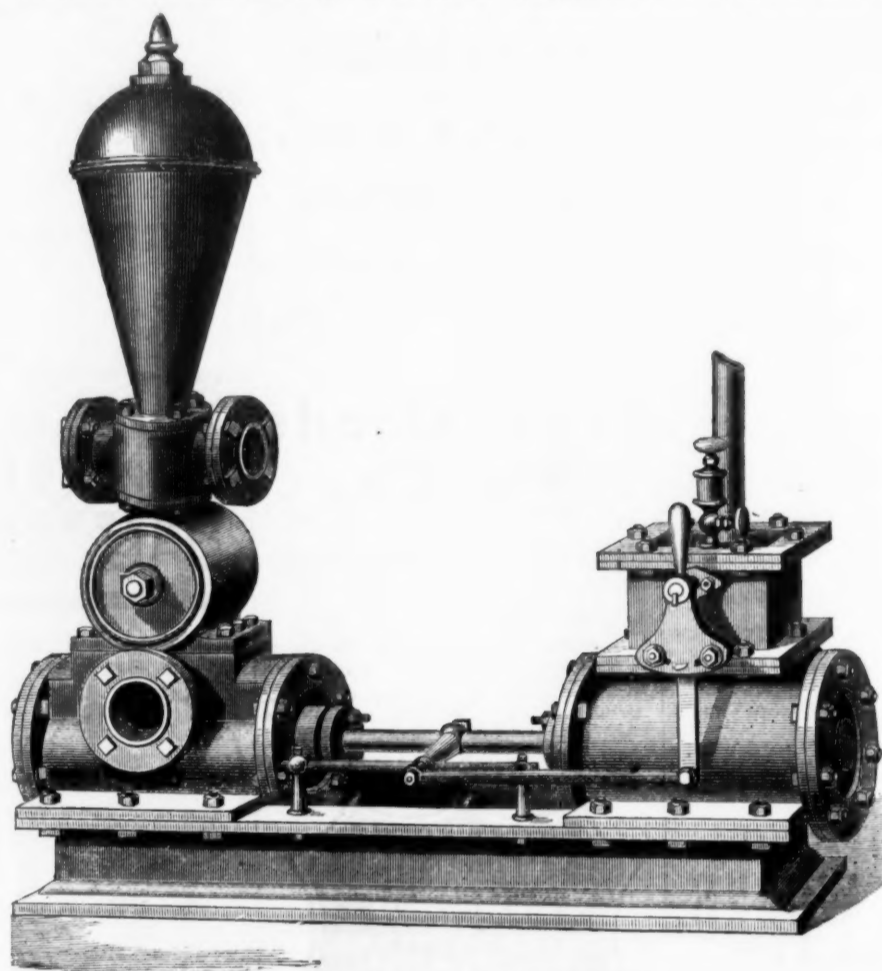
iron, for the softest homogeneous iron will wear out half a dozen of the best non-homogeneous or puddled iron rails. Iron may be alloyed or otherwise hardened or improved, but so long as iron is puddled and piled it will have a lamellar structure, and the action of heavy wheels upon it will elongate and detach the upper strata from the lower, and cause a rapid destruction of the rail. One may see the same action going on in deal planks used for wheeling barrows upon, the longitudinal grain of the wood causing the splitting off of the surface immediately acted upon by the wheel, and hence on all wood pavements the blocks are placed with the end of the grain upward.

"There is one statement in the paragraph to which we have referred which somewhat surprises us. It is to the effect that old steel rails are of little value. The fact is that steel rails remain at all times as perfect pieces of metal as when first laid down. A steel rail may be worn and reduced in section by long continued abrasion of particles from its surface; but it is not split and disintegrated like an old iron rail. We cannot understand why it should be stated that old steel rails are of little value. The great competition which exists in their manufacture enables them to be produced at a much lower price than other forms or sections of steel bar. The material of which the rail is composed is precisely as good after it has undergone any amount of wear, and the old rails can be used for many purposes for which it would not be economical to buy new steel. Old steel rails may be put through splitting mills, and used as a very small amount of rolling in proper grooved rolls, and almost entirely without loss of weight, can be converted into round, square or flat rods, wire, etc., useful for innumerable purposes, at much less cost than such rods could be made for from ingots of new steel. We are informed that a large number of steel plates are made in Sheffield from rail ends by cross rolling the waste pieces, for which excellent prices are obtained.

"As to the economy with which the new process can be carried out, it is difficult to see how it can possess any advantage in this respect over that of producing steel rails. There are now several works in this country making steel rails on the original plan patented by Mr. Bessemer, and working from the blast furnace direct, thus avoiding the labor and cost of making pigs and then remelting them. By the means in use at these works the fluid crude iron when converted is formed into ingots of the proper weight for two rails without any manual labor, and wholly without fuel, in about 25 minutes. It would be curious to see any process by which Cleveland ores could be dealt with more economically than by the plan adopted in this method of treating iron as it passes from the blast furnace. We are informed that Messrs. Bolckow, Vaughan & Co. are erecting works in the Cleveland district for the manufacture of steel rails. We would imagine that the firm would scarcely have gone to the expense of erecting works of this description had they been aware that some material equal in quality and lower in price could be produced by other processes direct from Cleveland ore."

Paper and paper-hangings are going abroad in a lively manner. The two agents sent abroad last summer to canvass for their sale have met with a degree of success which must prove an incentive to efforts in the same direction by other trades. Nearly a hundred tons of papers, varying in quality from cheap straw to fine ledger, have been sent to England in spite of the derision of British newspapers and the opposition of the dealers. The ability of the United States to export this line of goods in competition with its principal rival is established. The agent in England has just returned to this country, but he has left matters in a satisfactory shape, and the export will continue. He says it is possible to send paper-hangings to England also, but canvassing must begin earlier; the trade for 1877 in that quarter is over. The South American agent is having good luck in the sale of hangings. His orders from points on the west coast are large. He writes that more direct communication with New York is essential to a large sale of papers, because the freights from England are at present much cheaper; but hangings can be sold in spite of drawbacks. Meanwhile the regular export of these two kinds of goods is steadily increasing.

The fastest time across the Pacific has been made by the Occidental and Oriental steamship Oceanic. The ship arrived unexpectedly at San Francisco on the 26th ult., fourteen days' and fourteen hours from Yokohama, beating by twenty-one hours the time of the City of Pekin of the Pacific Mail line, on a recent trip, which up to that time had been the best across the Pacific. The rivalry between these two lines is now being pushed to the extreme, and their steamers are forced to carry freights at ruinous prices. Flour is carried at from \$3.50 to \$4 per ton, a rate very much less than from this port to Europe, while the distance and cost of carrying is very much greater. It is becoming a life and death fight between the lines.



HARDICK'S IMPROVED DIRECT-ACTING STEAM PUMP.

chest is very conveniently arranged for giving access to the valve in case of an obstruction of any kind. Access to the valves is obtained by the loosening of a single nut. The valves are plain, square pieces of metal, and in case of accident can be replaced by blocks of wood. This is a feature of much value, as it frequently happens when a pump is at work at some distance from a town that a metal valve would be a difficult thing to obtain. Where it is desired, leather, rubber or vulcanized fiber can be used to face the valves with. The pistons are fitted

hopes sometime since expressed by the chairman of the Northeastern Railway Company (Mr. Leeman, M. P.) that the experiments being carried out at the instance of that company, by Mr. Isaac Lowthian Bell, M. P., one of the directors, and the leading scientific authority in the northern iron trade, promise the greatest success. An eminent railway official has asserted confidently that by this process iron rails can be produced which will be more durable than steel, and which will have the merit of being much cheaper. This will be good news

for the Cleveland district would be enormous, and railway companies might fairly look forward to a considerable saving in the future in the important items of permanent way charges if experience should show these results can be obtained. Inquiries which we have made lead us to the opinion that, whatever may be the practical value of the process referred to in improving the quality of inferior Cleveland ores, it will scarcely produce a material equal to that known as Bessemer steel. If Mr. I. Lowthian

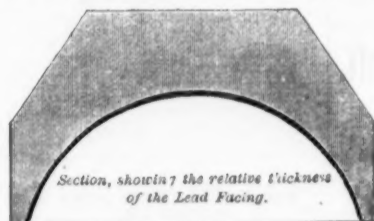


Fig. 1.

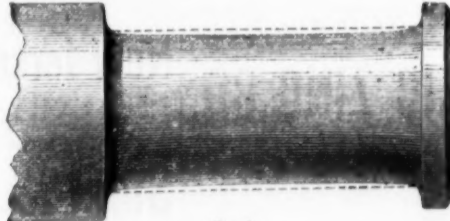


Fig. 2.

HOPKINS' LEAD FACING FOR JOURNAL BEARINGS.

with metallic packing, those of the water end and the lining of the cylinder usually being of composition where salt water, beer, liquors, molasses, syrups or acids are to be pumped. The piston and follower are so arranged, however, that hemp packing can be used if desired. The arrangement of the valve gear is such that the pump has no "centers," and will start in any position where there is a sufficient head of steam to overcome the resistance of the pump. This feature enables the pump to be started with certainty, even when, as is often the case in mines, it is "drowned out," or considerable distance under water. The manufacturer of this pump is Chas. B. Hardick, of 23 Adams street, Brooklyn, N. Y.

English manufacturers look with little cordiality on the French Exhibition of 1878. The London papers say "the world is tired of exhibitions." The fact is they dread another competition with American manufacturers in the presence of the world. Their defeat at Philadelphia is well understood in Europe, and a hurting their foreign trade, and another such

for Cleveland in the present depressed condition of her manufactured iron, and especially of her rail trade, which forms so large a feature in her industry. It has been the fashion to assert that the prosperity of Cleveland had departed, because of steel rails taking the place of iron, Cleveland iron, so far as is yet known, not being available for the manufacture of steel. The present experiments having proved so successful under the direction of the late president of the Iron and Steel Institute, at the works at Port Clarence, Middlesborough, put a new face on things. We learn that it is estimated that iron rails, greatly superior to steel in point of durability, can be produced at a cost of £1 per ton over the present ordinary iron rail, which will, therefore, largely undersell steel. There is the further advantage that the new class of rails will be reconvertable, and, therefore, be worth when worn out two-thirds of their original value; while steel rails when worn out are comparatively worthless for any purpose, so far as yet can be ascertained. There seems the greatest confidence, on the part of those who know the facts relating to the new

Bell has succeeded in discovering a way of so far improving the quality of the Cleveland iron as to make it equal to the iron of the Staffordshire district he will have accomplished an important result. We shall require, however, very considerable evidence of the practical results of this discovery before we bring ourselves to believe that iron rails can ever be made in point of durability equal to steel rails.

"Many attempts have been made to employ the Cleveland iron in the manufacture of steel, but hitherto without success in a financial point of view. The nearest approach that has been made toward giving iron rails a greater durability was under what is known as Dodd's patent, by which they were case hardened, and the surface converted into steel. The plan of puddling steel for rails has also been tried, but in no case has the rail produced been equal to those made from cast steel. Puddled iron has inherent defects which up to the present time have not been successfully removed. Every one who has paid any attention to the subject must be aware that it is not merely the quality of hardness which gives steel its superiority over

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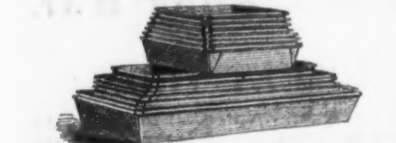
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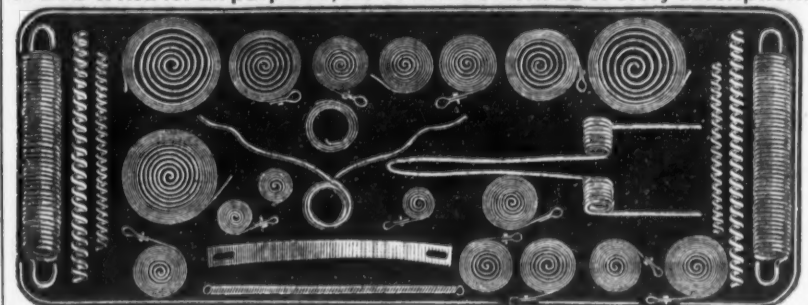
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Straightening and Planishing Metal Bars.

Mr. Edmund Butler, of Kirkstall Forge, Leeds, in a note on this subject, says:

It having been suggested to me to describe the process of straightening and planishing of round bars direct from the rolls as practiced at Kirkstall Forge, and which process, it may be considered, is a progressive step in the manipulation of round bars, the following few observations have been thrown together, and it is hoped that the brief explanation now given may be of service to those who may care to see the machine in operation, by calling attention to the particular imperfections in the rolling of round bars which it is intended to remedy, and by pointing out the advantages which are gained by it. It is not necessary to say anything about the importance to the millwright, engineer or machine maker, of having his round iron really round, and, what is of equal or even greater importance, straight. Nor is it necessary to speak of the difficulty the iron maker experiences in endeavoring to supply to the user such an article.

In spite of all the care and skill that can be exercised in the rolling mill, the ordinary round bar leaves it as a somewhat imperfect and but approximate cylinder, neither truly round nor truly straight.

It is a comparatively easy matter to straighten a bar which is bent in one uniform curve from end to end, but it is the short bends, crooks, or "dog legs," which are the main difficulty, the presence or absence of which makes a bad or good round bar; and these, which appear to be more or less inevitable in all rolling, can only be effectually removed while the bars are still hot, for with cold straightening there is always a tendency in the bars to revert to their original form when the skin is removed in the lathe. The production of a machine to accomplish the desiderata now in question has long occupied the attention and taxed the ingenuity of the iron master, particularly for the larger sizes, and many schemes have been initiated and tried, but the machine now under notice is the only one known to the writer which effectually removes "dog legs," and produces round bars sufficiently straight to be used for most ordinary purposes without being turned in the lathe.

The original idea, of which this machine is the embodiment, is due to Mr. J. Robertson, of Glasgow, though the same idea seems to have occurred almost simultaneously to Mr. G. W. Dyson, of Sheffield, and it is the general arrangement of the latter which has been adopted, though, since it passed out of the hands of these gentlemen, many improvements and additions—the results of practice and experience—have been made, which have given it the success it has now attained.

The bars are passed while still hot from the rolls between two revolving discs having beveled faces, which, when brought together so as to compress the bars between them with the degree of force thought necessary, rotate them, and, at the same time, traverse them forward, also by a mechanical arrangement backward, so that the whole length of the bar is acted on by one continuous movement, and the bars come out straightened and planished. In doing this, moreover, two other important results are produced, the most palpable of which is that the scale, instead of being rolled in, as might be supposed, is entirely removed, and the surface is made smooth.

The skin is brought to a very high degree of cleanness and smoothness, so much so that a mere rubbing with emery cloth, or if the bar be put into the lathe with emery stick, polishes it as though it had been turned and polished in the ordinary manner. In some small samples on exhibit, one end is left blue, as from the machine, and the other end is polished as just described, in order to show the inappreciable difference in diameter between the two portions. This is already done practically, and shafting is now running, which has been put up without being turned, while other shafting, after being put up in the same manner, has been polished in its place; and, again, the bars have been put into the latter and finished with the file and emery stick without being turned. To carry the finishing process still farther, if the bars, after being allowed to go cold, are passed again through the machine several times, the blue skin disappears, and the bars come out actually bright.

The other effect of the machine before referred to, and that a very important one, is that, by the action of the discs, the bars are slightly compressed, and consequently strengthened. Mr. David Kirkaldy has made some experiments to test the torsional strength; and in order to make proper comparisons, bars, after being rolled in the ordinary way, were cut in half, one portion being left with the ordinary finish, and the other portion being put through the machine; and it was found that up to the point of elastic stress the machined bars had gained 20 per cent. in torsional strength. Mr. Kirkaldy's original report is open to the inspection of any gentleman who may care to examine it; and several of the pieces tested are preserved. Some further experiments are about to be made on bars which have been operated upon recently, the machine having been much improved since the bars first tested were made, and now even better results are looked for.

Again, it is well known that a turned bar is not so strong as one of the same diameter which has been rolled in the ordinary way and left rough, that is to say, if a bar of, say, 3½ inches diameter, is turned down to 3 inches, it is not so strong as a bar rolled to that size and left rough; the additional strength arising from the non-removal of the skin of the rough bar. As, then, bars straightened and planished by this machine are 20 per cent. stronger than the same bars left with ordinary finish, if the comparison be made with turned bars, it is still more

favorable to the machined bar, and it is, therefore, important to use them wherever possible without turning, the polishing with emery removing so little of the skin as not appreciably to interfere with the strength.

With a view to render as economical as possible the operation of polishing these bars bright with emery, and without the expense of centering and putting in the lathe in order to use the emery stick, a machine has been constructed by Mr. Robertson to rotate and traverse the bars across the face of an emery wheel; and this first machine, on which great improvements are now being made, is now at work at Kirkstall Forge.

Some Recent Inventions.

The Centennial Exhibition afforded the opportunity to bring into public view many inventions and improvements which otherwise would only have been known to the smaller circles that may find them of service. Further publicity will soon be given by the judges' reports specifying the reasons for granting awards. These reports are looked for with great interest by all the favored exhibitors, but are as yet delayed, except in a few instances. It is quite certain that they will be voluminous. People who have wares to sell which the reports speak well of are likely to show good business enterprise by taking other means than the official publication will furnish to make such merits known. But this will not be the case with minor novelties, and in general with things that do not promise present profit by sales.

There is, for instance, an ingenious device for communicating directly to a central office by telegraph the changes in the weather, which are shown by recording instruments at different stations. It promises to dispense more or less with the work of the weather observer at each station, and to substitute the automatic work of machinery. This is a foreign exhibit. As shown, it is perhaps better adapted for its present use in one of the smaller European states than in this country. But if modified by Yankee ingenuity so that a separate telegraphic circuit would not be required for each station, it might prove of service here. The telephone is a new instrument of electrical science more likely than some of the rest to find immediate use. It operates by transmitting the current through a tuning-fork. The fork will only vibrate a given number of times in a second. A message can be sent through it by the usual Morse code, there being no apparent interference between the tuning-fork vibrations and the message. But at the other end of the line the message can only be taken off through a tuning-fork in unison with the first. Consequently if a tuning-fork of different pitch is interposed at each of several stations served by one wire, and the messages are sent through forks of corresponding pitch from the head office, the message to one station will not be repeated at the others during transmission. Sir William Thomson, at the Glasgow meeting of the British Association for the Advancement of Science, gave foreign notoriety to another of the Centennial exhibits that has attracted great attention from the judges of the group to which it belongs. It is a curious device that might fairly find place in the magic of Arabian tales. A membrane is stretched over the end of a short speaking trumpet. The membrane carries a small piece of metal which is, so to speak, the armature of a magnet. The magnet forms part of a telegraph circuit, through which a current is passing. To send a message it is only needful to talk loudly into the trumpet. The message is received by a similar trumpet with membrane and armature at the other end of the line; and that trumpet being placed to the ear repeats the sound like an echo. Don Pedro was with the scientific people who tested this instrument on one occasion. So accurately did it reproduce sounds that each member of the party was in turn recognized by peculiarities in voice or accent. The final test was the reading of a paragraph from the new columns of the *Tribune*. Of what use is such an invention? Well, there may be occasions of state when it is necessary for officials who are far apart to talk with each other without the interference of an operator. Or some lover may wish to pop the question directly into the ear of a lady and hear for himself her reply, though miles away; it is not for us to guess how courtships will be carried on in the 20th century. It is said that the human voice has been conveyed by this contrivance over a circuit of 60 miles. Music can be readily transmitted. Think of serenading by telegraph!

The calculating machine at the Fair was another of the new and strange inventions. Primarily it is an "adder." But it adds differences in groups and under all sorts of circumstances. Arrange it in one way and it will turn out cube numbers for you as fast as you can turn a crank. In another arrangement it will turn out logarithms as readily. Put on steam-power and it will do the work that it is set to without further attention. It furnishes its results stamped in a matrix ready for the stereotyper; no proof-reading is required. To the non-mathematical visitor its performances are utter mystery. Yet few machines are simpler. Take cubes for instance, 1, 8, 27, 64, &c.; subtract them from each other and the result is 7, 19, 37, 61, &c.; subtract these from each other and the result is a set of numbers that only differ from each other by 6. All that the machine does is to add these differences, beginning with those of 6 each. Yet in the endeavor to make a machine that would actually do this work many distinguished mathematicians have failed—among them the illustrious Englishman, Babbage. His machine is now lying idle and useless at the Kensington Museum. The American "difference engine" is pronounced by our experts perfectly successful. But what is to be the effect on our posterity of inventions like this? Already a modified contrivance of the sort makes short work of the multiplication table. Our grandchildren—nay, our children—will be turning a crank or twisting a screw instead of working out the four rules with slate and pen. Of the three R's, that which was the most essentially intellectual threatens to become the most mechanical.—*Tribune*.

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BEST QUALITY.

Their location, coupled with every known im-
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enable them to offer Rails, when quality is con-
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The long experience of the present Managers,
of the Company, and the enviable reputation they
have established for "CAMBRIA RAILS,"
are deemed a sufficient guarantee that purchasers can,
at all times depend upon receiving rails unsurpassed
for strength and wear by any others of American or
foreign make. Any of the usual patterns of rails
can be supplied on short notice, and new patterns of
desirable weight or design will be made to order.
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PATENT Planished Sheet Iron.

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In the Large cities throughout

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CURVED, STRAIGHT AND HIPPED
Wrought Iron Roof Trusses, Beams, Girders & Joists,
and all kinds of Iron Framing used in the construction of Iron Proof Buildings.

DECK BEAMS, CHANNEL, ANGLE AND T BARS
curved to template, largely used in the construction of Iron Vessels.

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For Top and Bottom Chords of Bridges.

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Plans and Specifications furnished. Address,

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AUSABLE FORKS,
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Manufacturers of
FINE CHARCOAL
Blooms & Bars

For Conversion into Cast Steel.

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FLAT IRON,
Exclusively from Palmer Ore.

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Corrugated Sheets of all sizes manufactured by Moseley
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NAILS AND BAR IRON.

Bands, Scrolls, Horse Shoe Bars, Nut and
Sivet Iron, Spike Rods, Shaping, Bridge
Bolts, Ovals, Half Ovals, Half Rounds, &c.

COIL CHAIN.

Agricultural Chain,
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We furnish a better article for less money than
any concern in the country.

Union Chain & Cable Co.,
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celebrated

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Post Chains, Breast Chains, Hold-Backs, etc. Sold by
all principal jobbers in General and Sundry Hardware.
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We hereby certify that Col. H. R. Foote has reduced and removed a Salamander from the hearth of
this Furnace, weighing over 26,000 lbs., in less than 48 hours, without removing the hearth or injuring the
stack, or shoveling out the stock. That his method is an entire success and worthy of the confidence
and patronage of all furnace men.

DAVID BRIDGALL, FELIX HUGHES,
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FOOTE & McNULTY,
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FOR THE
Construction, Remodeling and Repairing of Blast Furnaces,
Are prepared to

Remove Chills, Salamanders, or Scaffolding from Blast Furnaces,
WITHOUT REMOVING THE HEARTH OR INJURING THE STACK,
with promptness and upon reasonable terms.

Machinery and Men in readiness to go to any Furnace and com-
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For information address
FOOTE & McNULTY,

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be accomplished; but the entire removal of the lump, even after it may have become cold, can be effected
by our process very much quicker and cheaper than by blasting.

FOOTE & McNULTY,

REDUCTION.
Manila Pails
REDUCED TO \$7.50 PER DOZ.

These goods we warrant not
to be affected by climate, or
water, hot or cold.

Are Durable, Light, Strong
and Tasteless, have no
hoops, and will not absorb
their contents. Orders from
the trade solicited.

For circulars and terms, ad-
dress,
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Manufacturers' Agent,
280 PEARL ST., - - NEW YORK.

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Scroll Saws,
(Best in the Market.)

Flower Pot Brackets,
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AQUARIA, FILES, VISES,
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Manufacturers of every variety of
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Carriage, Machine, Floor, Stove and
Tire Bolls, Coach Screws,
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Portable Pyrometers are now in
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for the plug hole, Steam Gauges,
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Counters, Indicators for ascertain-
ing the Horse Power.
ALSO
REVOLUTION
INDICATORS.
which constantly indicate without the use
of a watch, the number of turns per minute
made by a Steam Engine.

1876.
ANIMAL TRAPS
Made by
THE SELLERS' MFG. CO.,
707 Market Street, Philadelphia, 83 Reade
Street, New York.

LOUISVILLE IRON MARKET.
A valued correspondent sends us the follow-
ing:
The market for pig iron in this city has ruled
dull all through the year. The table which we
give below will show better than words the
prices that have ruled. Every change in price
during the year is noted, the quotations of
January 1st being those last given in each
column:

Date, 1876.	Grades.—Hot- blast Charcoal— No. 1 Foundry from Hanging Rock Ores.	No. 2 Foundry from Hanging Rock Ores.	No. 1 Mill from Hanging Rock Ores.	No. 1 Foundry from Alabama, Georgia and Tennessee Ores.	No. 2 Foundry from Alabama, Georgia and Tennessee Ores.	No. 1 Mill from Alabama, Geor- gia and Ten- nessee Ores.	No. 2 Foundry from Alabama, Georgia and Tennessee Ores.	No. 1 Mill from Alabama, Geor- gia and Ten- nessee Ores.	No. 2 Foundry from Missouri Ores.	No. 1 Mill from Missouri Ores.	Cold-blast Char- coal.—Car Wheel from Hanging Rock Ores.	Car Wheel from Tennessee Ores.	Car Wheel from Alabama and Georgia Ores.	Car Wheel from Kentucky Ores.
January 1st.	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25
May 21st.	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25
June 19th.	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25
July 31st.	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25
September 13th.	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25
October 11th.	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25	\$20 @ 25

terest. The public cannot. It has no ma-
chinery better than a "crown" quest" for
doing so. Yet, in this matter the interest
of the public and the interest of the corporation
are far from identical. In a case of man-
slaughter we do not generally leave the in-
vestigation into the circumstances wholly in
the hands of those responsible for the killing.
Practically, this is exactly what we habitually
do in this country when the killing is done by
a railroad company. Here in Massachusetts
every railroad accident which occurs is at once
investigated by the Railroad Commissioners,
and if it presents any features of importance
a formal report upon it is published. These
reports always specify exactly how and
why the accident occurred, and who, if anyone
was responsible for it. The annual report
of the board for the last year will include eight
of these special reports, each one of which closes
with a distinct statement that "this accident
was due" to such and such causes. The board
is a special tribunal to conduct inquiries in the
case of accidents on railroads.

This matter, however, is one which does not
belong to the states, and it includes a duty
which the states cannot possibly fulfill. It is
an incident to commerce between the states.
Its dangers are like those connected with river
or coastwise navigation, and the national
government should take cognizance of them.
Will not you, therefore, take the matter
up and see to it, that some measure
is introduced into Congress which will
place it on a proper basis? Nothing radical is
needed. Congress need not assume any new
power, nor do anything even looking toward
general railroad legislation. The occasion does
not call, and no one asks for that legislative
nuisance, a "comprehensive" measure. All
that is necessary is that provision should be
made in connection with the Department of the
Interior for a bureau of railway statistics. It
should include two officers, the one an ac-
countant and statistician, the other a railroad
expert and engineer. The first should collect
and put in shape for reference the vast amount
of information connected with the interior com-
merce of the country, which is now practically
inaccessible. The last should make a study of
all railroad accidents, and himself specially in-
vestigate those which present unusual features,
or the cause of which is difficult of attainment.
The public would then know what the railroad
companies are now under the strongest induc-
ements to keep to themselves. In the first
place, it would know—what now it does not—
how many railroad accidents take place, and
how many lives are lost or injuries sustained
in them. In Great Britain last year—
carrying on their railroads at least twice
as many travelers as we did on ours—they
reported but 17 passengers killed. No one
can say how many were killed during the
same time in this country—probably 10 times
17. But apart from mere statistics, we should
then know to what causes—whether careles-
ness, or defective material, or imperfect ap-
pliances, or poor construction, or natural agencies
—each disaster was due. The experience of
one railroad would be made the experience of
all. Now each official is limited to his own
narrow range of observation. Finally, and
most important of all, through such an agency
the use of improved appliances could be ha-
stened. An official report stating with unpleas-
ant precision the conclusion that "this disaster
would not have occurred had the train been
equipped" with some well known appliance—
this conclusion exercises a wonderfully quick-
ening influence on every railroad official who
reads it. It is a form of words, also, which
would often have to be used.

The lives lost at Ashtabula will not have
been thrown away if, through you, they should
arouse Congress to a sense of the propriety
of creating some machinery through which other
and similar holocausts may be intelligently in-
vestigated. I feel very confident that if you
would introduce and now urge forward the
necessary measure to bring that about, you
would satisfy a strongly felt public demand,
and the law could be passed with opposition
from no one. With great respect, &c.,
CHARLES F. ADAMS, JR.
BOSTON, Jan. 9, 1877.

Closing of Extensive Iron Works in
South Yorkshire.—A further indication
of the condition of the iron trade has been affor-
ded by the fact that the old established iron
works at Swinton, belonging to John Brown &
Co., Atlas Works, Sheffield, are to be closed, as
the whole of the staff employed at them have
been discharged. When this district enjoyed
almost a monopoly in the manufacture of rail-
way tires, John Brown & Co. had the iron for
the tires prepared at Swinton, and it was then
forwarded to Sheffield for completion. When
the demand for tires fell off, chiefly on account
of the competition that sprang up in this coun-
try, Belgium and elsewhere, the company
ceased to make the iron at these works; and at
a very great outlay had the machinery altered
to produce plates, which were in better de-
mand. Even this branch, however, has ceased
to be remunerative, and on Dec. 9 a notice was
posted at the works, informing the whole of the
staff that their services would not be required
after Dec. 23. A rumor was current that it was
the intention of the company to sell the works;
but we believe such is not the case. They are
closed until trade has so far improved that they
can be carried on at a profit. For some months
past the men have been working most irregular-
ly, and of 28 furnaces only about half a dozen
have been lighted. The directors of this com-
pany evidently entertain the belief that there
will be no great activity in business this win-
ter.

Sir W. Armstrong has received orders to sup-
ply a number of heavy guns to the Chinese
government. They are to be tested by English
War Office officials.

Railway Disasters.
The following letter will be read with inter-
est:
The Hon. James A. Garfield, M. C., Washing-
ton—MY DEAR SIR: You, I believe, represent
the Ashtabula district in Congress. For this
reason, and this reason only, I apply directly
and personally to you in the hope, by so doing,
of securing some good public results from the
deaths of the hundred victims of the recent
Ashtabula railroad accident. As respects the
number of those killed, it leads, I believe, the
whole ghastly record. Before its details, then,
wholly disappear from the press, and the im-
pression made by it from the public mind, I
wish to call attention to one great want which
it revealed in our public system. All the world
in America travels, and the traveling is neces-
sarily done by rail. In that way the intercourse,
as well as the commerce, between the states of
the Union is kept up. Now, it is perfectly
true that this travel is wonderfully secure—not
taking the Union as a whole, so secure as it is
in Europe, but still its security is marvelous.
Allowing all credit to those to whom credit is
due on this account, it still remains true that
during the last four years there have been, upon
an average, 1100 reported railroad accidents a
year, resulting in the death of 250 persons and
the injury of 1000 persons annually. There also
are the cases of accidents, deaths and injuries
which we know of, without any system of of-
ficial reports. How many more have occurred
of which no record has been made we have no
means of ascertaining. Now, very likely it may
be said that this is not a large price on human
life and limb to pay for such an enormous
amount of transportation at such a great rate
of speed. This may well be so; and yet, un-
questionably, even this amount would admit of
great reduction. It can, however, be reduced
only by a careful study of its causes and by dis-
tinctly placing the responsibility for each acci-
dent just where it belongs.

In the case of the Ashtabula accident, for in-
stance, the railroad company can, and probably
will, investigate it thoroughly in its own in-

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WINDOW GLASS,
Wrought Iron Pipe and Boiler Tubes.
Chairs, Rivets, Nuts, Washers, and Heavy
Hardware Generally.
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Pig and Manufactured Iron, Steels, Limestone,
Clays, Slags & Coal for Practical Metal-
lurgical Purposes.

No. 339 Walnut Street, Philadelphia.
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This Laboratory was established in 1866, at the instance
of a number of practical iron-masters, expressly to afford
prompt and reliable information upon the chemical com-
position of the substances above mentioned, for smelting
and refining purposes. The object being to make it at
once a convenient, practically useful, and comparatively
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Mill.

CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an ordinary Ore.....	\$4 00
For the per cent. of Pure Iron, Sulphur and Phosphorus in do.....	12 50
For each additional constituent of usual occurrence.....	1 50
For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.	
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For each additional constituent of usual occurrence.....	6 00
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For determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore.	
For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.	
Printed instructions for obtaining proper average samples for analysis furnished upon application.	

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Screws, which can be supplied very advantageously
for foreign orders, though our duty equals the present
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Everything in the line. Eley's Goods. Colt's Re-
volvers, etc., etc. Bottom prices guaranteed.
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with knife wide upward. Warranted tougher than
any other Band Saw. Catalogues on application

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AND IN THE MOST
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MANNER
FURNISHED
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MAKING
COMPLETE
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WHEELS
MADE UNDER
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PATENT
FOR LOCO TRUCK
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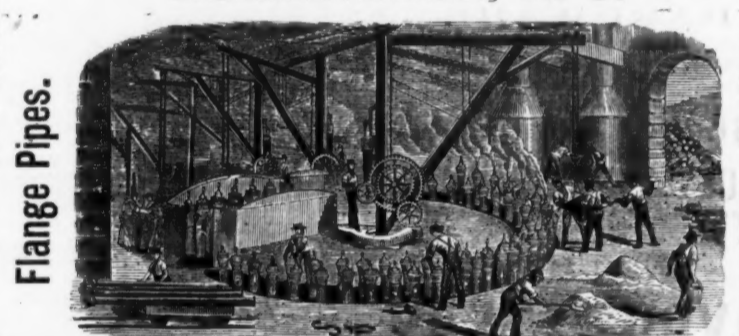
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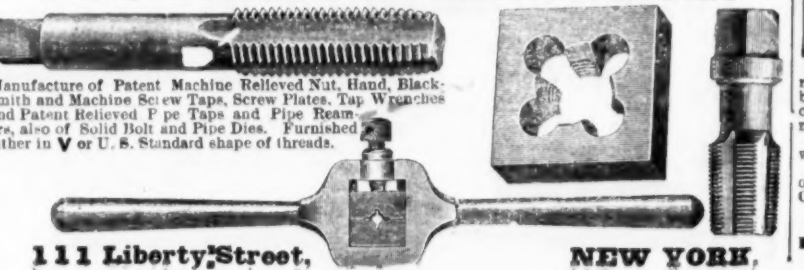
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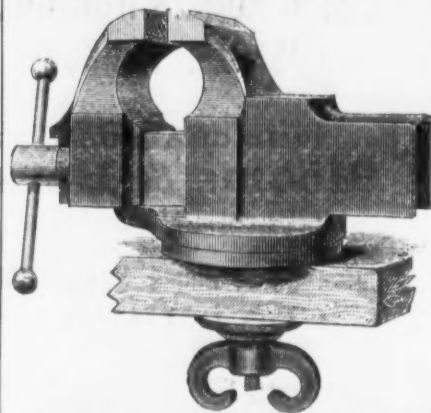
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especially adapted to Grocers' use and all retail-
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Will roast 30 to 40 lbs. at once, and can be used
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Capable of controlling with the utmost accuracy the motion of a watchman or patrolman as the same
reaches different stations of his beat. The instrument is complete in itself, portable and as reliable as the
best lever watch. It requires no fixture or wires communicating from room to room, as is the case with the
ordinary watch clocks. A small inexpensive stationary key is alone required at each station. The instru-
ment will, in all cases, be warranted perfect and satisfactory.
CAUTION.—The public are notified that in my suit against Imhäuser & Co., of New York, a decree
was made in my favor, June 10, 1874.
Proceedings have been commenced against said Imhäuser & Co., for selling clocks contrary to the
order of the Court, and especially the clock with a series of springs in the cover, and marked "Patented
Oct. 30th, 1874." All persons discovered using these infringing clocks will be dealt with according to law.

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P. O. Box 979. No. 230 Washington Street, Boston.
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Awarded the GRAND MEDAL of PROGRESS at WORLDS' EXPOSITION, VIENNA, 1873, being the highest awards on Pumps, &c., also, highest medal at PARIS in 1867, and Philadelphia, 1876, accompanied by Report of Judges.

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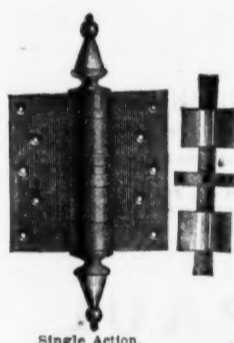
LOOSE PIN REVERSIBLE,

Cast Fast & LooseDrilled and Wire Jointed.
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and Real Bronze Butts. Also a full line of**IRON & BRASS PUMPS.**Garden, Well, and Force Pumps, Yard, Drive
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Hydraulic Rams, etc., and all with the most modern
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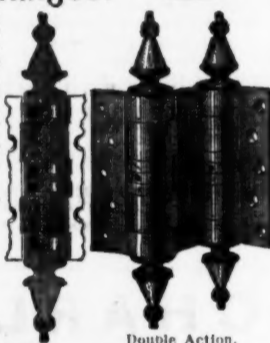
This Hinge has two flat coil springs, very powerful. It has a heavy solid pin, giving much less friction than a hollow pin. It has broad, solid bearings in the knuckle, which do not wear down easily and let the door sag. It is fast jointed, therefore can be used for either right or left hand. By actual test it has an average of 50 per cent. more power than other Spring Hinges in common use of same size.

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For terms and Prices, address,

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In Competition with the World, at Philadelphia, 1876.

TWO FIRST MEDALS, and TWO DIPLOMAS OF MERIT

The following are the points that the Judges officially announce as the basis of their award of the highest honors to the Howe Scales:

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BRANDON MFG. COMPANY, of Brandon, Vt.,

Are Guaranteed Superior to all others.

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A. M. GILBERT & CO., 95 to 101 Lake St., Chicago. 116 Main St., Cincinnati. 11 S. Main St., St. Louis.
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Protest of Steel Makers.

To the Secretary of The American Iron and Steel Association—Sir: Having learned, to our great surprise, that certain grades of steel of low carburization have been entered and allowed to pass through the custom house at the port of Boston, classed and appraised as iron, we earnestly request you to visit the Secretary of the Treasury, at your earliest opportunity, and call his attention to the following statement:

First.—Wrought iron is a technical term, known to the trade as covering all that class of iron which has been welded together from small, pasty particles while in the solid state, and which will not sensibly harden by dipping, when at a red heat, in water.

Second.—In fabricating masses of iron from small particles, in a solid state, it has been determined by practice that it is absolutely impossible to produce a homogeneous mass by this method.

Third.—There are methods by which steel can be manufactured: a.—By converting wrought iron while in a solid state, which is known as the "cementation process." This method is not capable of producing a homogeneous metal, because the wrought iron from which it is made is not homogeneous, and the iron remains in its solid condition during the cementation. b.—The fusion in crucibles of wrought iron or of carbonized iron into a liquid condition, and then purifying it at a high temperature by the use of various ingredients. This is known as the "crucible steel process," the carburization or decarburization being effected while the metal is in a fluid condition. The product when properly made is strictly homogeneous. c.—Arresting the decarburization of pig iron at the desired point. There are two divisions of this method: first, as practiced in the puddling furnace in the manufacture of puddled steel, in which case the decarburization is arrested while the mass is in the solid state, and, in consequence, the product will not be homogeneous; the second division embraces all those methods in which the decarburization of pig iron is arrested at any point below 1½ per cent. of carbon, while the metal is in a fluid condition, such as the "Bessemer" and the "Martin-Siemens" processes, both of which are capable of producing a homogeneous metal. d.—By decarburizing and recarburizing pig iron while the metal is in a fluid condition, as practiced in the "Bessemer" and "Martin-Siemens open-hearth" processes, the product of which is homogeneous.

Fourth.—From the foregoing statement it will be observed that in all the wrought iron of commerce hitherto made, whether by the initial Catalan process or by the more generally practiced puddling process, a distinguishing characteristic of its manufacture has been that it is decarburized while in the solid state, and it will also be noticed that all such iron so made possesses a distinguishing physical feature, that of not being homogeneous.

Fifth.—All metal produced by the "Bessemer" or "Martin-Siemens open-hearth" process, of whatever degree of carbon, bears the evidence of having been made while in a liquid condition, and has the distinguishing physical character of homogeneity. The appearance of fractured wrought iron is entirely different from that of steel, the former possessing a fibrous character. If the iron exhibits a granular fracture, as it occasionally does, even then it is radically different from the peculiar granular structure of cast steel, and easily distinguishable by a practiced eye.

Sixth.—In the manufacture of iron and steel the waste of metal increases with an increase of temperature. Therefore, metal produced by any liquid process will cost more to manufacture, as at present practiced, than wrought iron produced at so low a temperature as not to reduce it to a fluid condition.

Seventh.—It is a fact well known to metallurgical experts that in the manufacture of metal by any liquid process, as described, the more perfect the decarburization is, the greater will be the cost; hence, steel low in carbon produced by the "Bessemer" or the "Martin-Siemens open-hearth" process costs more to manufacture and commands a higher price in the market than steel of such manufacture containing larger percentages of carbon.

Eighth.—Iron cannot be produced by either the "Bessemer" or "pneumatic" or the "Martin-Siemens" or "open-hearth" processes, for the reason that, after the decarburization of the contents of the Bessemer converter or of the open-hearth furnace, the metal contains so great a quantity of oxide that should it be taken therefrom before being recarburized—with the view of using it as iron—the product in that condition would be such as could not be worked and would be unmerchantable. Therefore, the contents of the Bessemer converter and the open-hearth furnace must be recarburized, thus converting it into steel, before it can be made useful or merchantable, and the resulting metal is steel and nothing but steel.

Ninth.—For the reasons herein given, we consider the use of the term wrought iron to denote homogeneous metal produced by any liquid process as unwarranted, and an abuse of technical nomenclature, calculated to result in great loss of revenue to the government and of immeasurable distress to the trade. We therefore express the hope that the honorable Secretary of the Treasury will, if not inconsistent with his sense of public duty, instruct the collectors of customs in all the ports of entry in the United States, that all metal produced by the Bessemer, Martin-Siemens open-hearth, or any other processes by which decarburization is conducted while the metal is in a liquid condition, must be classed—and pay the duty provided by statute—as steel.

In addition to the foregoing, we hope the erroneous classification and improper levy of

30 per cent. duty on steel wire rods less than one-quarter inch in diameter may be corrected. It is clearly provided in the statute that steel in coils shall pay the same duty as steel in ingots, sheets or bars, and not be classed as "steel not otherwise provided for."

Respectfully yours,

Park, Bro. & Co., Black Diamond Steel Works, Pittsburgh, Pa.
Reese, Graff & Woods, Fort Pitt Iron and Steel Works, Pittsburgh, Pa.
Miller, Metcalf & Parkin, Crescent Steel Works, Pittsburgh, Pa.
Smith, Sutton & Co., La Belle Steel Works, Pittsburgh, Pa.
Singer, Nimick & Co., steel manufacturers, Pittsburgh, Pa.
Anderson & Passavant, Pittsburgh, Pa.
Hussey, Howe & Co. (formerly Hussey, Wells & Co.), Pittsburgh, Pa.
The Edgar Thomson Steel Co., Limited, by Wm. P. Shinn, General Manager, Pittsburgh, Pa.
Brown & Co., Wayne Iron and Steel Works, Pittsburgh, Pa.
Otis Iron and Steel Co., steel manufacturers, Cleveland, Ohio.
Cleveland Rolling Mill Co., by A. B. Stone, President, Cleveland, Ohio.
Cooper, Hewitt & Co., steel manufacturers, New York and New Jersey.
Nashua Iron and Steel Co., steel and iron manufacturers, Nashua, N. H.
Bay State Iron Co., per John H. Reed, Treasurer, Boston, Mass.
James R. Thompson & Co., Jersey City Steel Works, Jersey City, N. J.
Gregory & Co., Adirondac Steel Works, Jersey City, N. J.
D. G. Gautier & Co., Jersey City, N. J.
Benjamin Atha & Co., Newark Steel Works, Newark, N. J.
R. R. Chrisman, North River Steel Works, Jersey City, N. J.
Albany & Rensselaer Iron and Steel Company, by Chester Griswold, Vice-President, Troy, N. Y.
Cambria Iron Company, by E. Y. Townsend, President, Philadelphia.

The Standard Steel Works, by Wm. Burnham, Secretary and Treasurer, Philadelphia.
Pennsylvania Steel Company, by S. M. Felton, President, Philadelphia.
Midvale Steel Works, by Marriott C. Smyth, Secretary and Treasurer, Nicetown, Philadelphia.
The Bethlehem Iron Company, by Joseph Wharton, Philadelphia.
Alex. Foster & Co., Fairmount Steel Works, Philadelphia.
Wm. Baldwin, Philadelphia Steel Works, Frankford, Philadelphia.
William & Harry Rowland, Oxford Iron and Steel Works, Frankford, Philadelphia.
Bolton, Myers & Co., Canton, Ohio.
North Chicago Rolling Mill Company, by R. C. Hannah, Secretary, Chicago.
Johet Iron and Steel Company, by H. E. Bigelow, Secretary, Chicago.
Lackawanna Iron and Coal Company, by W. W. Scranton, General Manager, Scranton, Pa.
Burgess Steel and Iron Works, Portsmouth, Ohio.

The Production of Pig Iron in 1876.

Commenting on the tables of iron production in 1876, published in our last issue, Mr. James M. Swank says in the *Bulletin of the Iron and Steel Association*:

These figures show a total production in 1876 of 2,050,000 net tons of pig iron, against 2,266,581 net tons in 1875—a decrease of 216,581 tons, or about 10 per cent. The shrinkage in production in 1876 will, however, be more apparent if we compare the make of that year with that of the four years immediately preceding. In 1872 the production was 2,854,558 net tons; in 1873 it was 2,868,278 tons; in 1874 it was 2,689,413 tons; in 1875 it was 2,266,581 tons; and in 1876 our estimate gives 2,050,000 tons. The decrease since 1873, our year of greatest production, is thus seen to be, in round numbers, 800,000 tons, or fully 28 per cent. This is a very great reduction, but any estimate of its significance which the reader may make will be erroneous if it does not allow for the increased tendency in late years to substitute old rails for pig iron. Nevertheless, the shrinkage in the quantity of pig iron produced in this country since 1873, after making due allowance for the use of old rails, is not a cheering subject to reflect upon, especially when we remember that the furnace capacity of the country is equal to the production of twice the quantity of pig iron produced last year.

Of the total estimated production of 1876, 287,000 net tons were charcoal, 777,000 tons were anthracite and 986,000 tons were bituminous coal and coke pig iron. In 1875 we made 410,990 tons of charcoal, 908,046 tons of anthracite and 947,545 tons of bituminous. The production of bituminous iron in 1876 was a trifle larger than in 1875; that of anthracite and charcoal each decreased fully 100,000 tons—the shrinkage in charcoal being relatively much greater than that of anthracite, amounting to more than 25 per cent. In 1875 the production of bituminous pig iron for the first time overtook that of anthracite, exceeding it about 40,000 tons; but it 1876 it shot ahead about 200,000 tons.

Our table shows that stocks of pig iron have decreased from 760,908 net tons at the close of 1875 to 660,000 tons at the close of 1876—a shrinkage of 100,908 tons, or about 13 per cent. The figures we present for both years represent stocks unsold in the hands of furnacemen or their agents, our object being to show the relation of the producers to the market. We do not include stocks in the hands of consumers, speculators, creditors or importers. It is not possible to obtain figures representing stocks after they leave the hands of the makers, but it is possible to obtain the statistics of pig iron in first hands, and these only we give. It is proper to remark, however, that where stocks of pig iron are held by furnaces which are connected with rolling mills they are necessarily included in our table; also that hypothecated stocks are likewise included.

Of the total stocks of pig iron held by furnacemen and their agents at the close of 1876, our information shows that 225,500 tons were charcoal, 276,500 tons were anthracite, and 158,000 tons were bituminous. At the close of 1875 the exact figures were as follows: Charcoal, 320,683; anthracite, 274,743; bituminous, 165,482. It will be seen that practically no

change has taken place in the stocks of anthracite and bituminous, except in their distribution, which a study of the table will fully indicate, while the decrease of 100,000 tons has been wholly in charcoal. It is here proper to remark that several thousand tons of Lake Superior charcoal held at Cleveland are included in our table among Michigan stocks.

All testimony agrees that stocks of pig iron in the hands of consumers are very low, perhaps lower than ever before known. Some of the rolling mills are carrying a larger supply of muck bar than usual, but not many. The mills generally have less pig iron on hand than usual, and this is true also of the foundries. A decided improvement in the demand for iron would find the mills very generally unprepared to meet it, except so far as that unknown quantity, old rails, might help them; while the foundries would certainly have to buy largely of pig iron. We do not learn that much pig iron is anywhere held by the creditors of unfortunate furnacemen, so that producers have but little to apprehend from that quarter. Probably 50,000 tons of American pig iron have passed from first hands into the hands of speculators, as we learn that 10,000 tons are so held at New York and 23,000 tons at Pittsburgh. Of foreign pig iron in the hands of importers there cannot be much, as the total importations of 1876 did not probably exceed 50,000 net tons, all or nearly all of which was Scotch iron for immediate consumption. From the best information we have been able to obtain we do not consider it probable that the stocks of pig iron in the hands of consumers, creditors, speculators and importers at the close of 1876 exceeded the quantity estimated to have been so held at the close of 1875, namely, 200,000 net tons. Adding this to the stocks in first hands at the close of 1876, namely, 660,000 tons, we have a total of 860,000 net tons of pig iron estimated to have been then practically on the market or in consumers' hands, against a similar total at the close of 1875 of 960,908 tons—a decrease of 100,000 tons upon all stocks held at the close of 1875.

Our imports of pig iron in 1876 we have already stated were about 50,000 net tons. In 1875 they aggregated 66,000 tons. Our exports of pig iron in 1876 amounted to about 4000 net tons, against 8700 tons in 1875.

The consumption of pig iron in the United States in 1876 was undoubtedly much less than in any of the years immediately preceding. We have estimated that we produced 2,050,000 net tons; reduced the stocks of the preceding year 100,000 tons; and imported 50,000 tons; total, 2,000,000 net tons. These figures indicate the consumption of the year. We make no account of our insignificant exports. In our last annual report (page 164) we have given the consumption of pig iron in 1875 at 2,324,300 net tons; in 1874 at 2,734,539 tons; in 1873 at 3,012,883 tons; in 1872 at 3,149,045 tons. We do not give in this statement any figures concerning the number of furnaces in and out of blast at the close of 1876. Correct information upon this point is now being obtained, and will be published in due time. We have, however, reason to believe that not more than one-third of the furnaces of the country were then in blast. These, however, were generally new furnaces of large capacity. At the close of 1875 the proportion of furnaces out of blast was not so great, the exact figures being as follows: whole number of furnaces, 713; out of blast, 430; in blast, 283. If we consider the improvements in blast furnace management that have been made during the past year, and the further fact that the furnaces in blast at the close of the year were mainly our best furnaces, we think it entirely safe to assume that the country was making as much pig iron per day at the close of 1876 as at the close of 1875.

As an indication of the range of prices for pig iron in 1876 as compared with 1875, we give the following average quotations of No. 1 anthracite foundry pig iron at Philadelphia at the beginning and close of each year: 1875, January, \$25.66; December, \$23.50; 1876, January, \$23.25; December, \$21.50. The decline in both years was gradual. There was no advance in either year, if we except an advance of about a dollar a ton in the spring of 1875, which, however, was not long maintained.

Cleveland Capitalists in America.—Some time ago an English company, bearing the name of the Southern States Coal, Iron and Land Company, Limited, was launched. The principal directors of the company, Mr. Thomas Whitwell, of the Thornaby Iron Works, South Stockton, Mr. Henry Fell Pease, of the Middlebrough Chemical Works, and Mr. Edwin Lucas Pease, ex-mayor of Darlington, are now visiting the properties of the company in America. These gentlemen will soon return, and no doubt they will give an interesting account of their visit. The capital of the company, consisting of £100,000, in 1000 shares of £100 each, with power to increase to £500,000, has been applied to the purchase of three estates—the Battle Creek, the Cumberland Mountain, and the French Broad. The Battle Creek is on the River Tennessee. There is abundance of iron and coal on the estates, and the company having commenced operations are hopeful of a great industrial future.—*Engineering*.

Westmoreland County Coke.—The *Bulletin of the Iron and Steel Association* says: We observe that Stoner, Hitchman & Co., coke manufacturers of Mount Pleasant, Westmoreland county, Pa., have received the Centennial award for general excellence of the quality of their product. The award is signed by Frederick Prime, Jr., Matthew Addy, W. S. Keyes, Alexander L. Holley, and John Fritz. This would seem to put Stoner, Hitchman & Co.'s product in advance of all Connellsville coke. The Baldwin Locomotive Works, Pennsylvania Railroad Co., J. B. Seidel & Sons, the Mont Alto Iron Co., C. W. & D. V. Ahl, and others are now using it with entire satisfaction. It is delivered to purchasers at remarkably low figures. Iron manufacturers would do well to give it a trial.

USE THE BEST.



Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

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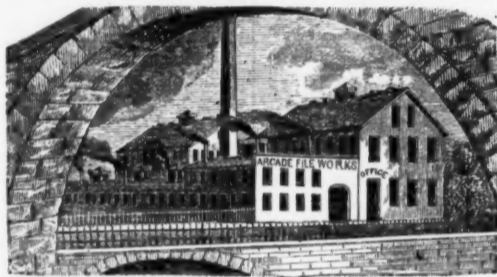
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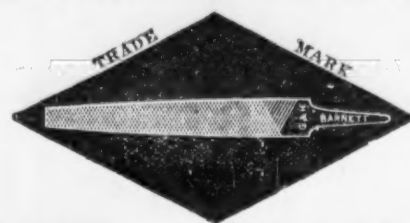
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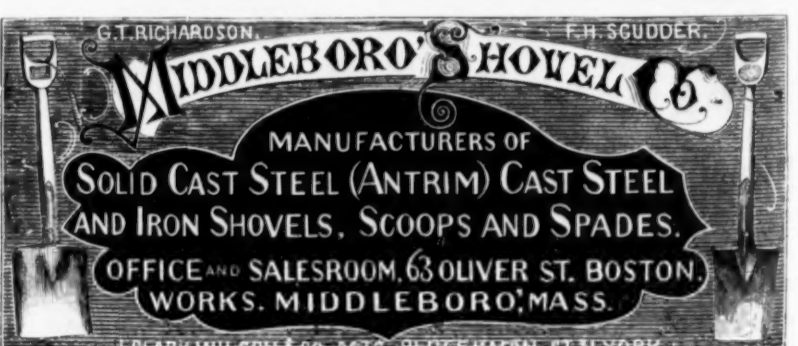
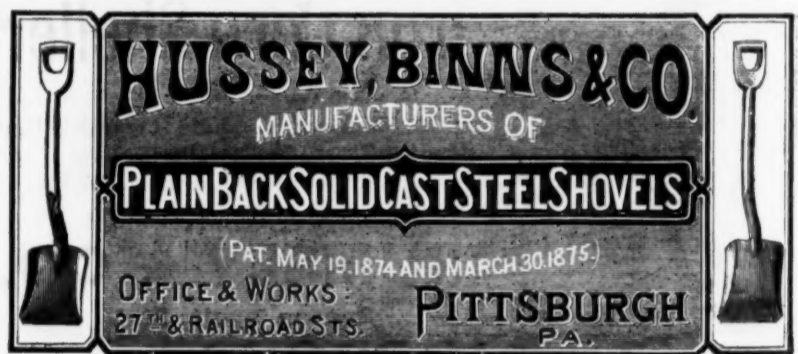
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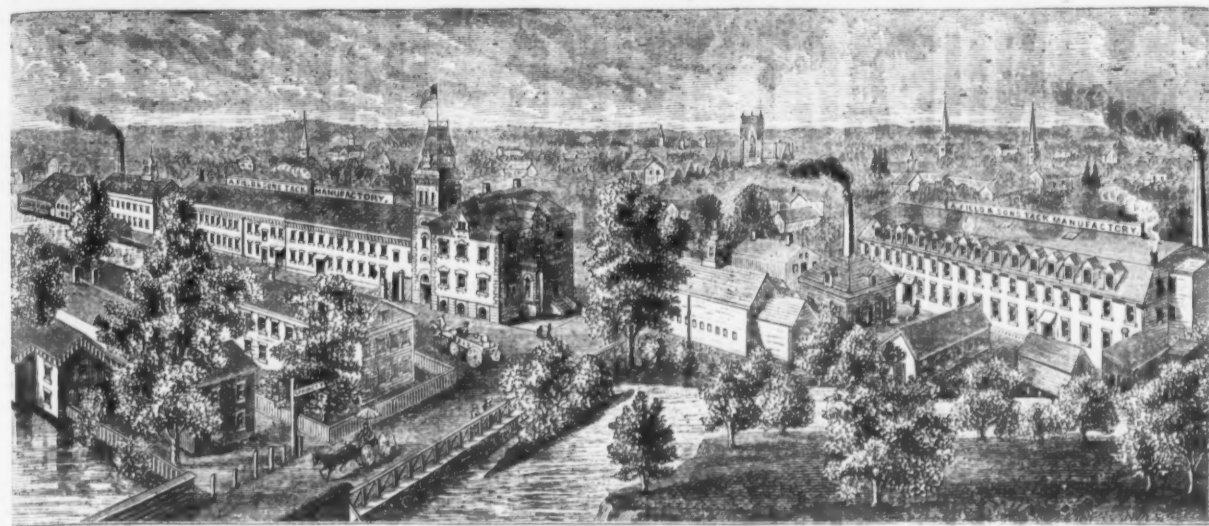
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MANUFACTURERS OF
SPRING BALANCES,
Patent Balances,
Union & Counter
SCALES.
SPIRAL SPRINGS,
Fenn's Faucets & Cork Stops.
John Chatillon & Sons,
91 & 93 Cliff St., N. Y.

PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873, and Highest Award and Medal at Centennial Exhibition, Philadelphia, 1876.

CLARK & CO.,

Original Inventors and Patentees

OF
**Noiseless Self-Coiling Revolving
STEEL SHUTTERS,**
FIRE AND BURGLAR PROOF.

Also Improved

Rolling Wood Shutters

Various kinds. Clark's Shutters are the Best and Cheapest in the world. Are fitted to new Tribune Building, Lenox Library, Delaware and Hudson Canal Co.'s Building, Transatlantic Steamship Co.'s new Dock, American News Office, &c., Posey County Court House, Mt. Vernon, Holt County Court, Oregon, Mo. Also to buildings in Boston, Cincinnati, Detroit, Janesville, Wis., Baltimore, Canada, &c. Have been for years in daily use in every principal city throughout Europe, and are favored by the Leading Architects of the World.

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PRINCE'S METALLIC PAINT,
AN INDESTRUCTIBLE COATING FOR
IRON, TIN, OR WOOD,
For Sale by the Trade and
PRINCE'S METALLIC PAINT CO.,
Manufacturers,
225 Pearl Street, New York.
Caution.—As certain parties are offering for sale
SPURIOUS PAINT, under an imitation name,
purchasers will please see that our TRADE MARK
is on every package. None other genuine.

THE DOUGLASS MFG. CO.,

New York Warehouse, 62 Reade Street. P. O. Box 2610.

FACTORIES, Seymour, Conn.

MANUFACTURERS OF:



**PREMIUM
Mechanics' Tools,
COOK'S
Boring Implements.**
Chisels, Gouges and Drawing Knives of all kinds, Screw Drivers,
Screw Driver Bits, Cook's and Douglass Mfg. Co.'s Augers &
Bits, Wood and Metal Head Gimlets, Improved Hollow
Augers, Blake's Patent Extension Bits,
Boring Machines, Chisel Handles, Wood Boxes, Tool Chests.



ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.

Office, 19 & 21 Cliff Street,
NEW YORK.



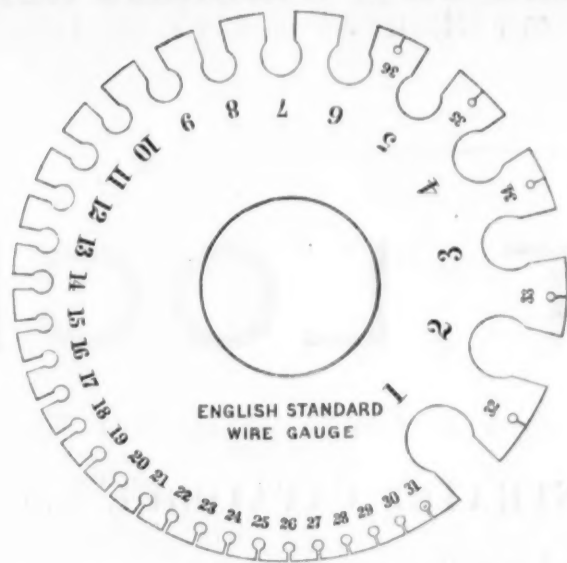
Cut Showing Round Platform.

Section Showing Edge.

The Ansonia Corrugated Stove Platform, with its heavy figured edge border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no lining.

The low price, superior quality and fine finish of this Platform will be readily acknowledged. Packed 100 in a case. Send for price list.

English Standard Wire Gauges



ENGLISH STANDARD
WIRE GAUGE

MADE BY

DARLING, BROWN & SHARPE, Providence, R. I.

INDUSTRIAL ITEMS.

CONNECTICUT.

The Farrel Foundry and Machine Company, of Ansonia and Waterbury, are pushed with orders and running evenings. They have just added a large and powerful new engine lathe to their works in Waterbury. It is 6 feet swing, and a bed 22 feet long.

The Colt's Armory Works took advantage of the holidays to overhaul machinery, boilers, etc.

The Seth Thomas Clock Company, of Thomaston, are manufacturing a little time-keeper called the "Nutmeg" clock. It is very small and keeps perfect time regardless of the position it may be placed in. The company are turning them out at the rate of two hundred per day, and claim that they could dispose of 20,000 per week had they sufficient manufacturing capacity.

The British steamer King Arthur has been at New Haven loading with ammunition for the Turks. She has already taken on board 27 car loads from Bridgeport.

The Turkish government ordered 60,000,000 cartridges of the Winchester Arms Company, of New Haven, and within twelve weeks 30,000,000 of the number have been made.

A communication has been received by the Board of Trade from an Eastern manufacturer relative to the location of extensive works at Bridgeport, for the construction of engines, mill machinery, etc.

It is expected that the Wheeler & Wilson Factory, Bridgeport, will resume active operations early this month.

RHODE ISLAND.

The Providence Tool Company, at Providence, are putting aboard the steamer Lotus 70,000 rifles and as many bayonets and scabbards, manufactured for the Turkish government, and the vessel will call at New Haven for metallic shells, and thence sail for Constantinople.

MASSACHUSETTS.

The Belcher & Taylor Tool Company, of Chicopee Falls, have declared and paid an 8 per cent. dividend, and elected the following officers: Directors: E. O. Carter, president, William E. Barrett, William P. McFarland, Henry A. Chase and Charles A. Taylor; clerk, James E. Taylor; agent and treasurer, George S. Taylor; auditors, Henry A. Chase and Charles A. Taylor.

The Ames Plow Company, of Worcester, now occupy two acres with buildings and stock in the northern part of the city, employ 160 men, make 300 styles of plows and other tools to match, and are at work on orders from Africa and South America. They have one building, four stories high, devoted to patterns.

They are producing at Brockton about 10,000 needles a day at the factory of Charles Howard & Co. These embrace about 20 different kinds, and are all for the standard sewing machines.

The Leominster Tool Company have been organized for the manufacture of "horn-workers' tools."

The Douglas Axe Company report plenty of orders.

Work on the Emery testing machine, at the Ames Works, Chicopee, is going on rapidly, and it will probably be finished very shortly. This machine is one of the largest yet constructed, and contains many novel features intended to insure great accuracy in the results obtained. We shall watch the work of this machine with great interest.

The Taunton Iron Works Company have shut down to put in a new cupola, which will increase their capacity for melting iron.

NEW YORK.

The creditors of Swett, Quimby & Perry, of Troy, held a meeting Friday, the 22d ult., when a committee of five reported that the creditors would settle at 75 cents on a dollar. The firm have the offer under consideration, and will probably accept it.

Thirty-five of the forty puddling furnaces at Burden's Steam Mill on the flats, at Troy, are in operation. All the "trains" are running and one blast furnace.

PENNSYLVANIA.

The Valentine Iron Company, of Williamsport, has been reorganized, and capital and practical working force engaged of sufficient amount to undertake putting the rolling mill in first-class condition, with a view of making small sizes of iron for carriage bolts, sewing machine purposes and the like. The mill was burned down a short time since, but the heating furnaces and the iron working machinery were not so much damaged as to prevent their being put to use again.

The minerals of Clinton and Lycoming counties, embracing pipe clay, red hematite iron ore, silver glance (or black oxide of silver), a nickel bearing rock, and the conglomerate slates and marbles peculiar to the locality, are just now attracting attention, and there seems a prospect that considerable efforts will soon be made to develop these resources.

The iron works in the neighborhood of Pottsville suffer so far from the general depression as to desire to be counted out of a report in industrial news.

The Williamsport machinery manufacturers are anticipating a revival of business with the new year, and preparing themselves accordingly.

Waterman & Beaver, at Danville, are at present running one of their furnaces and half capacity on their rail mills. Groves Brothers, at the same place, are running but one. The iron trade in this part of the Susquehanna Valley is in a very depressed condition.

Robinson & Co., Tamaqua, have a fair share of orders for job, foundry and machine work.

The Tamaqua Rolling Mill Company are employed to a fair extent on merchant iron.

The manufactory of rails at Milton seems to have proved a good success, as the mill at

that place is running with an uninterrupted business.

The tannery of W. H. Reber, Milton, is now handling 250 hides per week. The stock is domestic slaughter, marketed in Philadelphia, in the sole leather and belting trade.

The manufacturing interests of the Susquehanna Valley are very much depressed.

Shimer & Co., at Milton, in connection with the production of shooks, cloth boards, etc., are making a grooving and tonguing head which is obtaining general celebrity with planing mills throughout the country.

The Milton Rolling Mill Company have resumed full time and the employment of a full complement of hands.

The car works of Murray, Dougal & Co., Milton, are reported to be in operation to their full capacity.

The Andrews Saw Works, at Williamsport, is near about idle, awaiting the opening of spring and summer trade.

Twenty-five employees at the Lehigh Valley Machine Shops, in South Easton, were suspended on the 3d instant.

The huge chimney at the glass works of Gilinder & Son, Philadelphia, fell with a tremendous crash on the morning of the 26th ult., doing damage to the extent of \$5000. The chimney was 100 feet high and 30 feet wide at the base. The accident was caused by allowing the fires to go out on Saturday, when the extreme cold weather contracted the bricks, thus rendering the supports inadequate to carry the immense weight of the chimney.

The new furnace of the Cambria Iron Company, at Johnstown, has gone into blast, and is working very satisfactorily, turning out about 70 tons of No. 1 Bessemer iron in 24 hours. It is constructed on a new plan, has a capacity of 125 tons, and is considered the finest and largest furnace in the United States.

The Pottstown Iron and Brass Foundry, after lying idle for some time, resumed operations on the 1st instant.

The Pottstown Iron Company had 10 of their ore cars damaged by a mishap on the Reading Railroad. The "monkey box" was also smashed. All will be repaired at once.

The Birdsboro nail factories were idle last week.

Hands are busily engaged in repairing the Gibraltar Rolling Mill.

We are pleased to note that Messrs. White & Sanson, cutlery manufacturers, of Frankford, have opened a salesroom in Philadelphia, at 221 Market street, which it is expected will be quite a convenience to the trade, and also advantageous to the firm. We understand they are working full time, and with a full complement of hands are not more than keeping pace with their orders.

The Enterprise Manufacturing Company, Philadelphia, are running a full force of hands on full time, and are increasing their export trade. The demand for Mrs. Potts' sad irons, coffee mills, &c., is especially active.

The firm has a large and steadily increasing demand from England for goods of their manufacture.

The New Castle Courier says that five out of the seven furnaces in that city are now in full blast, and each turning out an average of about fifty tons of iron per day, or three hundred and fifty per week, making a grand total of seventeen hundred and fifty tons of iron per week made in New Castle alone. The Sophia Furnace, the first one built in New Castle, and the Little Pet, both small furnaces, are the ones standing idle. The Aetna Iron Works and the New Castle Sheet Iron Works are both running double turn.

The Reading Hardware Company is making extensive preparations to introduce improved machinery. A set of large duplex boilers will be put in place and a temporary engine house built. This will be followed by the erection of a 150 horse-power engine in the spring, when permanent buildings will be erected.

Employees of the Pottstown Iron Company's Works are cleaning the boilers, preparatory to a resumption of work.

It is rumored that the party who purchased the rolling mill at Blandon intends starting it up again.

Marietta Furnace No. 1 is in blast, and has been running since July, 1875. It is running on foundry iron, and has a capacity of 125 tons per week.

Reis, Brown & Berger's Rosena Furnace, at Newcastle, is soon to blow out after a continuous blast of three years and a half, in which time she has made over 75,000 tons of iron.

PITTSBURGH AND VICINITY.

The iron mills of Wilson, Walker & Co. are getting quite busy, and are now running full, with prospects for a heavy business in this year. They have recently arranged for the manufacture of some new staple articles to be made by a new and improved process.

The Crawford Manufacturing Company, manufacturers of malleable iron goods, are running their works to full capacity, with orders booked sufficient to keep them going rapidly for the next three or four months. They are now filling a contract for 300 tons of malleable castings. During the latter part of the past year they had to run their works double turn. They make specialties of agricultural implements and harness goods.

Messrs. Kloman, Park & Co. are employing at this time about 40 hands in the manufacture of axes and mining and railroad tools. Their prospects are good for a considerable increase of trade this year.

The Pine Creek Furnace, Allegheny Valley, is just ready to blow out, the lining being used up. It is filling an order for Byers, McCullough & Co., and will then go out.

The Edgar Thomson Steel Works were to resume, on January 2d, in all their departments, the workmen having accepted the reduction proposed in November last, which is in effect the same rates as paid at Johnstown. It was the refusal to accede to this reduction that led to the suspension.

It is stated that Messrs. Moorhead & Co., of the Soho Iron Works, have notified their employees of a 10 per cent. reduction, to take effect when the mill resumes. This will not affect the puddlers.

(Continued on page 18.)

RUSSELL & ERWIN MANUFACTURING COMPANY

MANUFACTURERS OF HARDWARE.

Factories, NEW BRITAIN, CONNECTICUT, U. S. A.

Manufacturers' Agents and Dealers in General Hardware at our
WAREHOUSES,

NEW YORK, - - - Nos. 45 and 47 Chambers Street.

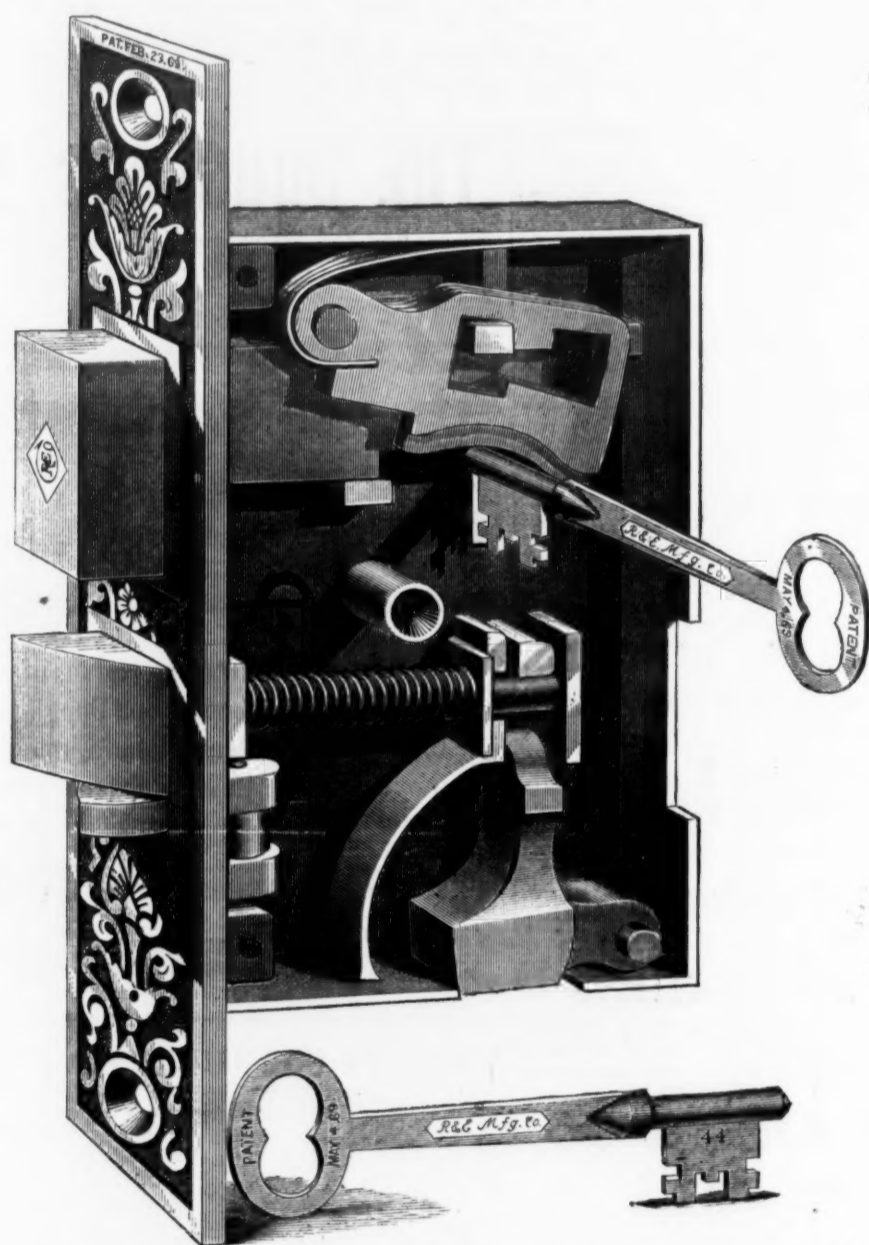
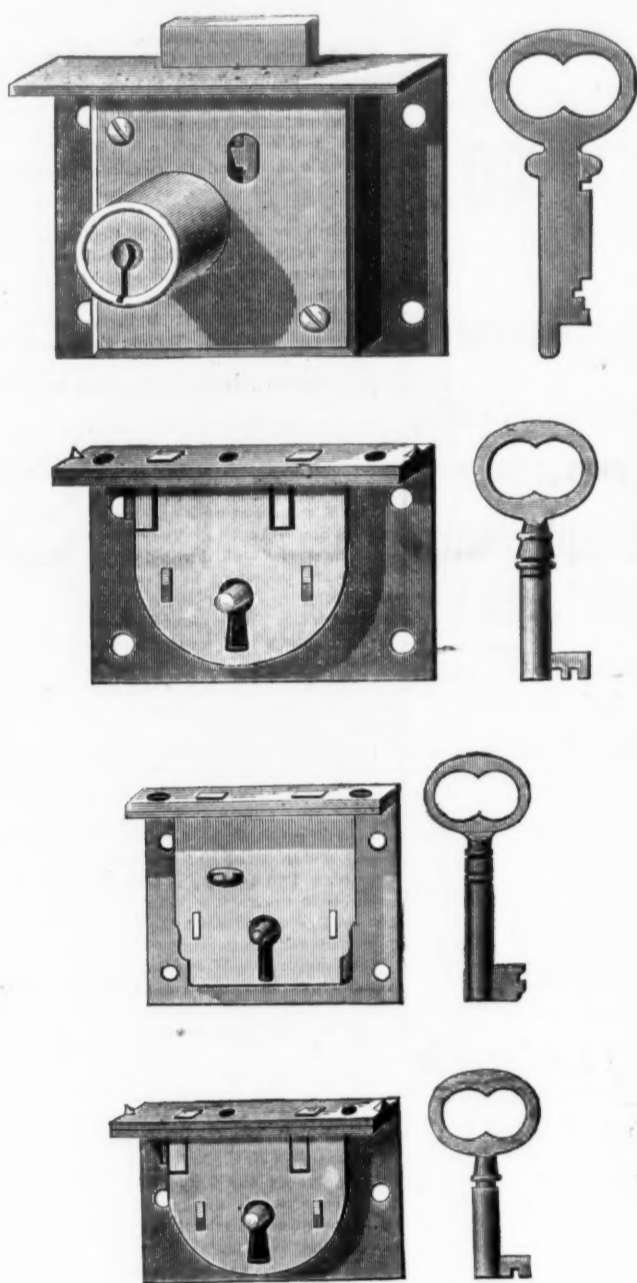
SOUTHERN DEPARTMENT,

PHILADELPHIA, - - - No. 425 Market Street.

BALTIMORE, MD., WM. H. COLE, AGENT, 17 South Charles St.



$\frac{3}{4}$ Size cut of Bronze Handle of Store Door Latch.



Full Size cut of Bronze Store Door Lock and Latch, with Patent Anti-Friction Latch.

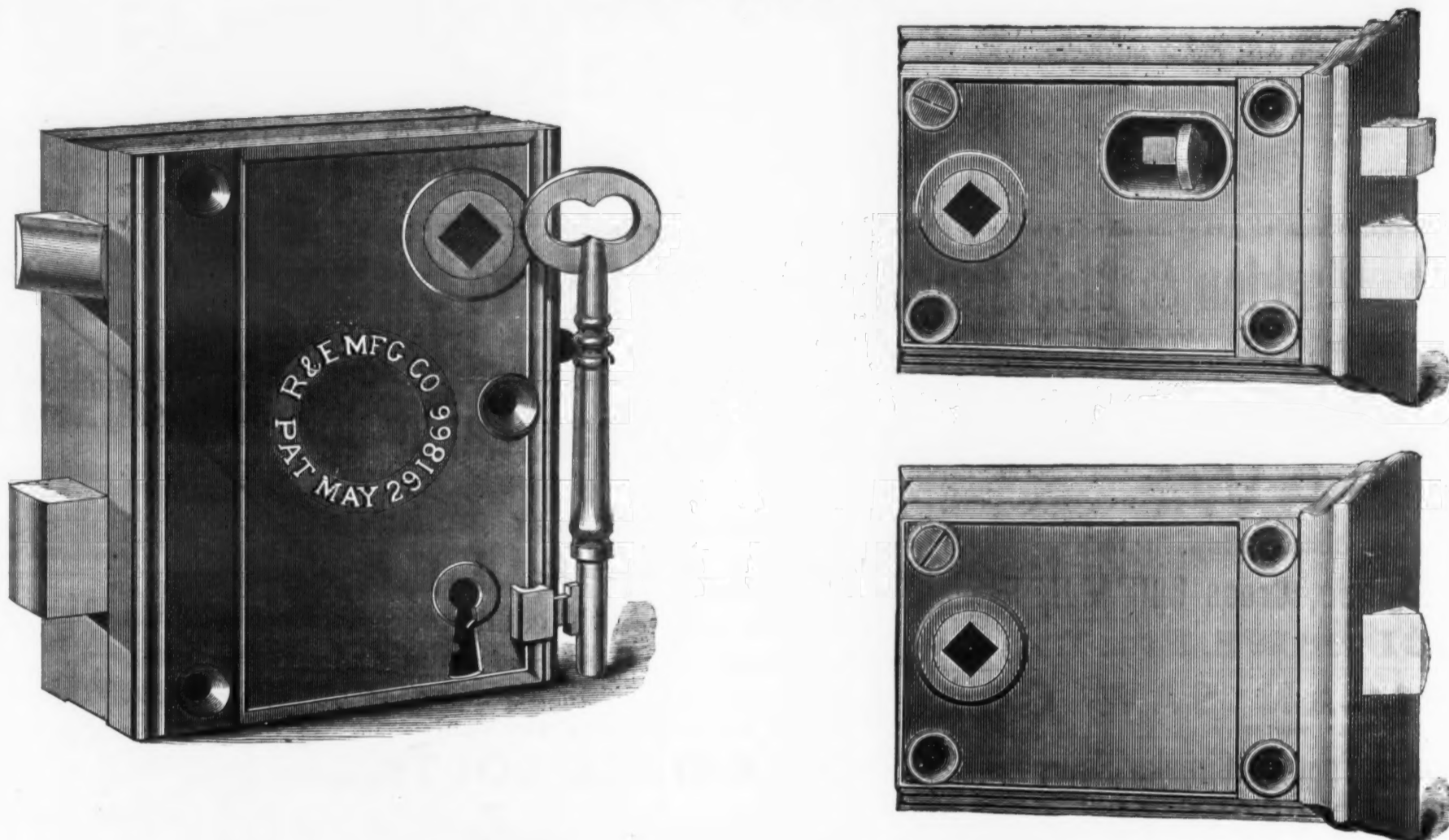
The action of the **ANTI-FRICTION LATCH** is sure and effective—doing away with all friction and jarring when closing the door. We shall also apply this latch to our Railroad Car, Front Door, and our better grades of Mortise Locks.

CABINET LOCKS.

Our assortment of these goods is complete, and we can also supply a full line of "Eagle" and "Gaylord" Locks at manufacturers' prices. An **ILLUSTRATED CATALOGUE** will be issued at an early date. Parties can meanwhile order by either Eagle or Gaylord numbers.

RUSSELL & ERWIN MANUFACTURING COMPANY

CONTINUED.



NEW GOODS.

In consequence of the high prices established for Brass Bolt Rim Knob Locks and Latches, we have determined to place upon the market a new line of **BRASS-PLATED** goods, for which we solicit orders for immediate delivery. We shall increase our variety as occasion may require.

These goods are furnished with **BRASS-PLATED BOLTS** and **SOLID BRASS** Keys, and in make and finish are equal to our standard goods.

HOME UPRIGHT RIM KNOB LOCKS. PULL-OUT REVERSE.				HORIZONTAL RURAL KNOB LATCHES.			
No.	Size.		Without Knobs Per Dozen.	No.	Size.		Without Knobs Per Dozen.
B 861.	4 inch.	Janus face, 2 Brass-plated Bolts, Solid Brass Key, without Stop	\$5.00	B 557.	3 1-2 inch.	Brass-plated Latch Bolt	\$4.00
B 861 1-2.	4 inch.	Janus face, 2 Brass-plated Bolts, Solid Brass Key, with Stop	5.25	B 552.	3 1-2 inch.	Brass-plated Latch and Slide Bolt	5.00

Discounts, same as on our regular goods.

SCREWS.

We are now producing from 5000 to 6000 gross per day of **FLAT HEAD GIMLET POINT SCREWS** of **QUALITY** and **FINISH** which we **GUARANTEE** to be **SUPERIOR** to that of any other Screws manufactured in the **WORLD**, and we invite a comparison under the **SEVEREST TESTS**.

Our prices will at all times be as low as those of any standard manufactures, and we solicit letters of inquiry for quotations before orders are given elsewhere.

Our Screws are all packed in our new Patent Paper Boxes bearing our labels on which are **LARGE FIGURES** denoting the **SIZE** and **NUMBER**.

PEACE & HOGAN, VULCAN SAW WORKS.
Manufacturers of every kind of
Patent Ground
SAWS.
Circulars, Cross-Cuts, Mill,
Muley, Gang, Hand, and Butcher.
Molding and Planing Knives,
Plastering Trowels, Miter-
ing Rods, &c.
Union Avenue, Tenth and Ainslie Streets, **BROOKLYN, E. D., N. Y.**
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E. C. ATKINS. ESTABLISHED 1857. H. KNIPPENBERG.
E. C. ATKINS & CO., Indianapolis, Ind.,
Saw Manufacturers and Repairers.
Sole manufacturers of the celebrated
GENUINE SILVER STEEL DIAMOND X CUT SAW.

\$1.50 Per Foot.



BEWARE OF THE IMITATION CALLED "DIAMOND TOOTH."

Wheeler, Madden & Clemson
MFG. CO.,
MIDDLETOWN, - - - NEW YORK.

Manufacturers of
WARRANTED CAST STEEL
SAWS

Of every description, including
Circular, Shingle, Cross-Cut, Mill, Hand,
WOOD SAWS. Etc., Etc.

AMERICAN SAW CO.,
Manufacturers of

Movable Toothed Circular Saws,
PERFORATED CROSS-CUT SAWS
And **SOLID SAWS** of all kinds. **Trenton N. J.**

E. M. BOYNTON,
Manufacturer of all kinds of
First-Class Saws, Saw Frames, Cross-Cut Handles, Tools, Files, &c.
Also Sole Proprietor and Mfr. of the Genuine Patent Lightning Saw,
No. 80 Beckman Street, NEW YORK.

Special attention is called to my new Centennial Saw,
patented March 28th, 1876; Special File and Saw-Set
combined, patented June 30th, 1876; Cross-Cut (Loop)
Saw Handle, patented February 15th, 1876; New One-
Man Saw, with Patent Double Removable Handle At-
tachment, March 28th, 1876; New Patent Champion
Clearer Tooth, patented August 15th, 1876; Saw Set,
patented Nov. 28th, 1876—a perfect Set that a blind man
can use to condense like a Hammer Set perfectly; Cross-
bar Wood Saw Frame, patented Nov. 12, 1872; also Cross-Cut Handle, with castings, patented Feb. 15, 1870.
These goods complete the scientific tools for cutting timber, instead of wearing it off with notched V
teeth (which are like a fractured plate sharpened).



AWARDED CENTENNIAL MEDAL AFTER ACTUAL TEST.

REPORT ON AWARDS. GROUP No. 15.

Product: Saws in great variety: special improvement in shape of teeth, called Patent Lightning Saw.
Name and Address of Exhibitor: Eben Moody Boynton, New York.
The undersigned having examined the product herein described, respectfully recommends the same to
the United States Centennial Commission for award, for the following reasons, viz:
Report: "Being of very Superior Quality and of great Practical Utility." DANIEL STEINMETZ,
Signature of the Judge.
J. D. INBODEN, of Virginia, CHARLES STAPLES, of Maine, G. L. REED, of Penn., Judges.
J. DIFENBACH, of Germany, DAVID McHARDY, of Scotland, D. STEINMETZ, of Phila., Judges.
A true copy of the record.
Given by authority of the U. S. Centennial Commission.
J. L. CAMPBELL, Sec'y. A. T. GOSHORN, Director General. J. R. HAWLEY, Pres.

FORT PLAIN SPRING AND AXLE WORKS.



FOR FALL TRADE.

All dealers in **SPRINGS AND AXLES** will find it to their interest to send to us for
Price List and Discounts.
CLARK, SMITH & CO., Fort Plain, N. Y.

TURNED MACHINE SCREWS.
One-sixteenth to five-eighths diameter.
Heads and points to sample.
IRON, STEEL AND BRASS.
Lyons & Fellows Mfg. Co.,
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Iron, Steel, Nails,
HEAVY HARDWARE, WAGON AND CARRIAGE MATERIAL, DRILLS,
ANVILS, BELLOWS, VISES, CHAINS, &c.
CHICAGO ILLS.

IRON BLOCK PLANE.

1-2 Inches Long, 1 3-4 Inch Cutter, \$9.00 per dozen.



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NORWAY IRON FANCY HEAD BOLTS.
Carriage & Tire Bolts. **Star Axle Clips, &c.**
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COLEMAN
EAGLE BOLT WORKS.
(ESTABLISHED 1845.)

The Original and Only Establishment Manufacturing the
Genuine Coleman Eagle Bolt.

Made of Best Quality

SQUARE NORWAY IRON.

WELSH & LEA,

Successors to M. J. COLEMAN.

WORKS, Columbia Avenue, Hancock and Mascher Sts.,

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CARRIAGE BOLTS.

Buy the Best.



Clark's Patent
Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and cannot
turn in its place.

MANUFACTURED BY

CLARK BROS. & CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, etc.
Send for Illustrated Price List.

HOOPES & TOWNSEND,
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"Keystone" Boiler Rivets,
BRIDGE & SHIP RIVETS.

ESTABLISHED 1855.

Philadelphia Rivet Works,
CHARLES B. ALLEN,

Seventeenth and Hamilton Streets,

PHILADELPHIA.



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tomers, consumers of and dealers in rivets generally, that
he has resumed the manufacture of

BOILER, BRIDGE and SHIP RIVETS.

at the above location, where he will keep constantly on
hand a large assortment of all the regular sizes.
Special sizes made to order.
Particular attention paid to the selection of the best
quality of iron. A share of your patronage will be thank-
fully received. Yours, respectfully,
CHARLES B. ALLEN.

A Fact. Jobbers & Dealers in
CARRIAGE AXLES

Buy Goods of the

Best WARRANTED material

FOR THE LEAST MONEY OF THE

CLEVELAND AXLE MFG. CO.

Send for Prices and Sample Lot.

CLEVELAND OHIO.

C. R. MOON & CO.,

Dealers of
WROUGHT IRON HARDWARE SPECIALTIES FOR WAGONS,
And all kinds of **CARRIAGE AND WAGON MALLEABLES.**

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MOON'S IMPROVED NECK YOKE.

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TURNED MACHINE SCREWS.
Case-Hardened Set, Cap and Gibb Screws, Hexagons,
Collar, and Drilled Head Screws, Agraffes and Nuts
Bolts, Special Screws, Rivets, &c., made to
order of Iron, Steel or Brass. Also Brass Knobs of all
sizes made to order. Our Screws are made of the best
Low Moor or Norway Iron, and are uniform in size.

J. Billerbeck & Co.,
KEYSTONE SCREW CO.,
Manufacturers of
IRON GIMLET-POINTED WOOD
SCREWS.
17th & Venango Sts., Philadelphia.



BACKUS BROS.
Manufacturers of
GLASS OILERS & THE
BACKUS WATER
MOTOR
For Sewing Machines
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Cor. Wright St. & Ave.
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Send for Circulars.



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ESTABLISHED 1839.

TACKLE BLOCKS
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Patent Iron Strapped Blocks,
Also, MANUFACTURERS OF
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BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

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COACH SCREWS (with Gimlet Point),
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FORGED SET SCREWS AND TAP BOLTS.

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Polished Groove Steel Rollers.

Manufacturers of a full line of

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IMPROVED IRON SHEAVES.

Our Iron Sheaves when used in Blocks do not add to their cost. The deep groove protects the rope, and the iron will not warp, check or crack, as lignumvitæ is so liable to do. A trial will satisfy.

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ARE MADE BY

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THE BEST ADJUSTABLE HOLLOW AUGER MADE.

Every machine is tested by actual work, and will easily make the whole range of work claimed. The Knives being sharpened and adjusted before leaving the factory, gives to the mechanic a tool ready for immediate use. The cut is for brace use; the size larger is used with a crank. For sale by

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DEAD EYES,
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to

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for the manufacture of the Japanese Paperware, Water Pails, Chamber and Commode do. (Slop Jars, Foot Baths and Water Carriers), Bowl and Pitcher, Pans, Basins, Cu-padores, Spittoons, &c., &c.

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JAMES C. BAYLES, Editor.
JOHN S. KING, Business Manager.

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One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$25.00; one year, \$40.00; payable in advance.

DAVID WILLIAMS, Publisher,
10 Warren Street, New York.

WESTERN OFFICE.

20 Fifth Avenue, Pittsburgh.
JOS. D. WEEKS, Manager and Associate Editor.

PHILADELPHIA OFFICE.

220 South Fourth Street.
THOS. ROBSON, Manager.

EUROPEAN AGENCY.

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Our Export of Hardware and Machinery.

The prospect held out to our export trade for the year just begun is rather encouraging than otherwise. Many of the dealers abroad have visited the Centennial and extended relations among us, having had an opportunity to compare our goods with those of other manufacturing countries; seen the works of many of the firms and made the personal acquaintance of owners. Many who till now gave the subject little attention have perceived clearly that our goods have a great future abroad in competition with those of European manufacture, and during the past twelve

months various Eastern houses have established branches or agencies on the Continent and elsewhere for the purpose of studying the requirements of consumers with reference to what we produce or are capable of turning out. If unforeseen political events do not occur in the countries with which we are thus related, it is fair to presume that our business with them will be materially increased during the current and ensuing years, and that we shall then have a better outlet for our large manufacturing capacity.

In thus striving to conquer new fields, our principal attention will have to be directed to retaining the good reputation we have earned as to quality, finish and packing, while contenting ourselves with minimum profits. In the Spanish-American countries, including the republics, our trade in 1875 and 1876 has been much hampered by revolutions and financial disasters; from the latter even Brazil has not been exempt, but gradually the political status of those countries is relapsing into quietude, if we except Mexico and Cuba, still in the midst of trouble. In Australasia and at the Cape we have made good progress, and are superseding European edge tools, saws and implements steadily in those markets. The London *Mining Journal*, in a leader, cites the following incident:

A customer of a Birmingham mercantile firm, on his way from New Zealand to England, called at a large American saw manufactory, and being pleased with the samples shown him inquired the prices. The quotations were rather too high, and the visitor remarked that he thought that he could do better in Sheffield. "What price can you pay," inquired the manufacturer? The desired limits having been ascertained, the foreman of the different shops were called and frankly told the circumstances. The men then had a brief consultation together, and returned to the office with the curt but acceptable and wise reply: "We will meet you on the terms offered." The order, which was a valuable one, was, consequently, left at New York instead of coming to Sheffield. The buyer in this case has been a regular customer with Birmingham and Sheffield for 10 or 12 years past. His orders for saws are now wholly lost to this country.

In Germany and Russia our goods have been making headway steadily. For war purposes we have furnished for two years past large amounts of raw copper, cartridges, artillery, guns, &c., to Russia, Turkey and the Western Continental nations.

The important abolition of import duties on iron, steel and their manufactures in Germany attracts the attention of all competing nations, and, by way of experiment, many shipments will be made to that country henceforward. To what extent this will practically interest ourselves remains to be seen.

On glancing over the entire field it seems to us full of promise and well worthy the serious study of those who have hitherto confined themselves more exclusively to our own country and Canada. We possess the material, an advantageous geographical position, unlimited commercial opportunities, and an enviable prestige.

The Outlook in the Metal Trade.

The general elements contributing to prosperity in the metal trade have in many respects improved. Stocks in the hands of the trade and consumers are conceded to be much lighter than they were a year ago. Those in first hands are decidedly so. At the same time prices are, on the whole, materially lower, as the following figures will show:

Stocks and Prices on this Coast January 1.

	1877.	Price, gold, 100 lbs.	1876.	Price, gold, 100 lbs.
Copper.....	3,570	\$18.10	6,250	\$30.58
Tin.....	175	17.38	350	19.25
Lead.....	900	5.84	1,500	5.88
Spelter.....	50	6.08	145	6.55
Total.....	4,695		8,245	

While the general stock is but 56 per cent. of what it was a year previous, prices average about 9 per cent. lower, copper being 12 per cent. cheaper, tin 9 per cent., and spelter 7 per cent., lead being the only one of the four metals which had not depreciated to speak of. The price of tin plates stood \$7, gold, per box, on an average on January 1, 1876, and this year the same date \$6.15, gold, showing a decline of 12 per cent.

Taken together, the metals have declined to what we may call their intrinsic value, and with present moderate stocks and cheap money they would, under ordinary circumstances, attract speculation. The experience of the past three years, however, has scared speculators and discouraged the anticipation of wants by legitimate consumers. We consequently depend altogether on a natural revival in general business, which can only be brought about by a revival of confidence in the future.

In connection with metals and tin plates, the building trade will be the most important item we shall have to look to. Real estate in most of our greater cities has declined to 50 per cent. and less, of what it was three years ago, and building material in proportion. There is consequently, in view of a normal increase of population,

every inducement to resume the construction of private and public buildings and works. In the meantime, should war on a larger scale break out in Europe, immigration would also assume larger proportions and stimulate the building trade. Without indulging in sanguine expectations as regards building, we believe that the prospect before us is a fair one, and that metals at about their present value deserve the attention of the trade.

Our Foreign Trade.

The last of the monthly reports of the Bureau of Statistics brings the totals of our foreign trade down to the first of December, and makes a satisfactory showing. The figures may be summarized as follows: Imports for eleven months of 1876, \$395,301,484, against \$471,838,181 in the corresponding period of 1875—decrease, \$76,536,697; domestic exports (gold values), 1876, \$504,195,771, against 440,629,018 in 1875—increase, \$63,566,753. Imports of specie and bullion, 1876, \$23,572,100, against \$21,457,340 in 1875—increase, \$1,114,850; exports of specie and bullion, 1876, \$45,837,451, against \$67,707,527 in 1875—decrease, \$21,870,076. The domestic exports of merchandise (gold values) exceeded the imports by \$108,894,293, while in 1875 the imports exceeded our domestic exports (gold values) by \$31,200,163, thus showing a gain of \$140,103,456, gold, in favor of our export trade. In 1876 our exports of specie and bullion exceeded our imports by only \$23,265,261, against a similar excess in 1875 of \$46,250,187, showing a decrease of 50 per cent. in our gold shipments. The indications are all favorable to a further advantage in the matter of a favorable trade balance. The exports of domestic manufactures in 1876 were 14½ per cent. greater than in 1875, while the imports, inclusive of specie, were 16½ per cent. less.

The share of New York in the total foreign trade of the country is larger in imports than in exports. The following table shows the total imports at this port for three years:

Months.	1874.	1875.	1876.
January.....	\$30,610,679	\$24,831,250	\$29,756,229
February.....	35,439,646	36,923,360	37,977,330
March.....	42,269,448	38,289,583	39,018,967
April.....	40,764,927	30,037,367	33,804,232
May.....	36,470,532	34,068,048	33,671,511
June.....	34,987,778	32,107,784	31,108,987
July.....	33,377,729	27,118,188	30,033,079
August.....	33,043,035	31,534,492	32,806,716
September.....	31,371,083	34,510,040	33,539,949
October.....	28,494,447	31,888,878	34,439,477
November.....	24,256,272	22,119,561	33,196,366
December.....	24,733,866	31,333,670	31,931,963
Total.....	\$338,679,451	\$340,658,509	\$305,464,638

The total exports from this port during the same triennial period are shown in the following table:

Months.	1874.	1875.	1876.
January.....	\$26,116,146	\$29,410,728	\$23,666,625
February.....	33,706,473	32,133,509	32,423,036
March.....	25,447,040	27,234,228	36,308,303
April.....	25,765,301	25,619,533	22,179,363
May.....	35,657,248	29,969,772	30,095,798
June.....	36,355,067	41,996,136	38,010,367
July.....	32,958,106	30,414,770	33,378,348
August.....	31,501,166	36,465,588	36,465,588
September.....	33,913,247	30,758,998	36,169,866
October.....	28,900,305	25,276,182	24,399,679
November.....	24,436,835	25,487,940	25,597,408
December.....	26,002,427	25,967,012	30,059,595
Total.....	\$345,162,361	\$334,018,518	\$318,618,066

These totals include specie imports and foreign re-exports. The exports of domestic products from New York were as follows:

Months.	1874.	1875.	1876.
January.....	\$22,638,022	\$18,539,458	\$21,146,814
February.....	20,078,112	17,839,488	17,612,543
March.....	22,099,523	18,669,717	19,981,600
April.....	22,272,739	18,933,522	17,456,396
May.....	24,741,358	19,786,016	20,652,833
June.....	28,275,416	28,403,221	22,963,251
July.....	23,948,460	23,681,774	24,319,669
August.....	23,945,534	19,715,518	23,972,298
September.....	21,303,301	18,974,565	24,675,821
October.....	23,396,284	22,624,151	23,027,190
November.....	19,108,192	22,284,390	23,758,588
December.....	22,433,422	23,230,442	27,189,911
Total.....	\$274,201,898	\$247,681,724	\$265,774,302

The Cost of Railway Accidents.

Railway accidents are rather costly luxuries in Great Britain. From a carefully prepared statement published in a recent issue of *Iron*, we learn that the various railway companies paid as compensation for injuries to passengers during last year no less than £381,038, being an increase on the previous year of £25,162. In 1870 the amount paid was £322,510; in 1871, £312,334; in 1872, £299,389; in 1873, £364,509; and in 1874, £355,876. There was paid for damages to goods, &c.: In 1870, £123,931; in 1871, £141,288; in 1872, £186,619; in 1873, £231,707; in 1874, £351,293; and in 1875, £278,917. But these amounts do not include the cost of repairs to the rolling stock or to the permanent way and works, or the deterrent influence—which is sometimes considered—on passage traffic. The compensations paid on account of injury or damage together amounted, in 1875, for England, to £591,891, for Scotland to £39,595, and for Ireland to £28,469; making a total for the year of £659,955. And the totals under the same heads were: In 1858, £123,071; in 1870, £446,431; in 1871, £453,622; in 1872, £486,008; in 1873, £596,216; and in 1874, £807,169. We hear a great deal about the greater safety of railway travel in England as compared with the United States, but we do not deal with such large figures as these. Were our companies held to an equally strict

account for damage to life and limb as are those of Great Britain, our modest annual totals of railway accidents would probably be reduced by a very large percentage.

Furnace Capacity.

The letter from an "Ironmaster," which we publish on the opposite page, is one of those illogical productions which show how easily some people reach conclusions without much mental labor. We do not give it "for what it is worth," for that is not much, but because it gives expression to an opinion which seems to prevail in the iron trade, especially among those who reason from imperfect data or untenable premises. The writer complains, and not unreasonably, of the depressed condition of the iron trade, and attributes it to the fact that there is too great a producing capacity. So far, he does not go much astray, and had he stopped here his argument would have been incontrovertible. But after complaining of the number of new furnaces built during the past few years, he gravely assures us that the old must give place to the new, and that probably not more than half the stacks now standing will ever again make iron at a profit. If this be so, and we are dependent for our iron production of the near future upon, say, 350 of our best and most modern furnaces, we fail to see any occasion to regret that so many new men and so much new capital have gone into the business. Had it been otherwise, the revival in the world's industrial and commercial activities, which cannot be far off, would have found us dependent upon furnaces unable to compete with those of other countries, and we should have made little progress in the development of our iron producing resources until we had built new furnaces to supplement or replace them. As it is, we are ready to meet any competition on equal terms, and to produce iron at a price which will enable us to export it in manufactured forms. The only ones who, in the long run, will suffer from the increase in our furnace capacity during 1871, 1872 and 1873, are those who own the old and obsolete furnaces of insufficient capacity, which must now be abandoned.

Did the men who brought new capital into the iron trade during its season of prosperity make so great a mistake as some people suppose? Some did, who built costly furnaces in bad locations, or who built poor furnaces in good locations. Those who built well built wisely, so far as we can see. The panic may have been foreseen by a few, but no one could have foreseen the utter prostration of the past three years. *Ex post facto* wisdom is of very little account. They did the best they could with their capital at the time, and the future will vindicate the wisdom of their course. The mistake of those who deplore the increase of our furnace capacity is in an extravagant estimate of that capacity. If one-half, or even one-third, of our furnaces must be abandoned, our capacity bears not only a closer relation to our normal requirements than is generally supposed, but the country has been enormously benefited by a substantial progress in the right direction.

The Block System.

We publish in another column an article from the London *Engineer* upon the recent English railway accident. The views and criticisms upon the block system are worth careful attention. Our readers will remember that we have frequently pointed out the fact that the system itself was one liable to cause the severest of accidents; that it was liable to break down, and that in such a case the results would be most serious. Our opponents met us with the reply that the system was theoretically perfect, for a train could not enter upon a block until the line was clear, and that in case of the failure of the telegraphs or any part of the apparatus, the danger signals would be shown. But an accident occurred where the signals did not work and the danger signal was not shown, and the confidence inspired by the system was the cause of the wreck. Now we have an accident occurring when the signals do work, and according to the rule everything ought to be safe. In fact, we find that there are a great many combinations of circumstances which, when they occur with the block system, render an accident unavoidable, and these combinations seem to be not infrequent, while new ones are continually being discovered. A disquieting feature of the greater part of them seems to be the fact that even when known the remedy cannot be discovered. A similar combination of circumstances would again produce other accidents on the same lines where they occurred before, the experience not having yet developed the remedy. Much is said about insufficiently paid men, overworked men and the like.

The trouble seems to be deeper, and we apprehend that until greatly modified the system will not be satisfactory, unless with absolutely perfect mechanism automatic machines are devised to work the system. Men will not answer for the purpose. Long ago it was found that human agency could not be relied upon for shutting an engine's valves at each stroke. In the case of the block system we have an attempt to control the human engine by machinery, and we find the machine too much of a machine; it lacks in too many points, and its failures are likely to happen at the very time when the most serious results are to be expected.

Blast Furnace Economy in England and America.

The very complete mineral statistics of Great Britain, of which we have given a summary, furnishes the data for arriving at a knowledge of some very important facts connected with the manufacture of pig iron in that kingdom. We give below a table showing some of the results arrived at. It should be noted that where coke has been used it is reduced to its equivalent in coal, and also that the value of the ore is only the value of the native ore, and does not include the value of the imported, for which no figures are given:

	1874.	1875.
Tons of ore smelted.....	15,854,077	16,559,733
Tons of coal used in manufacture of pig.....	15,392,301	15,648,774
Tons of pig iron made.....	6,991,408	6,865,462
Percentage yield of ore.....	37.4.5	38½
Tons of coal used to ton of pig iron.....	2.354	2.617
Average value of native iron ore per ton.....	9/9.1.7	7.6
Average value of all kinds of coal per ton.....	7/3½	7/7
Average value of pig per ton.....	£2.15	£2.9.13½

We have no figures with which these can be compared in this country. Speaking from the best information at hand, we should say that the yield of the ore was considerably in excess in this country. According to Mr. Baker's figures, the quantity of ore used to make a ton of pig iron, average of 20 years, was 2.17-0.22, or nearly three tons, but at the present time a very large part of the ores used in the West will average 60 per cent., and many of the ores of the South 50 per cent. We think 50 per cent. would not be far from an average for 1876. The census gave the number of tons of ore smelted in 1870 as 4,303,847, making 2,032,821 tons of pig, which would be a yield of 47¼ per cent. of iron from the ore, and while the census is hardly to be regarded as gospel, it may serve as an indication of the truth.

Regarding fuel used. Taking Mr. Baker's figures again, we have 2.00-30.5 gross tons of anthracite per ton of pig. In the West the average of fuel used may be fairly put at 80 bushels of coke, or allowing one-third for waste in coking, 2.142 tons of coal. The probability is that in this country we are smelting a richer ore with somewhat less coal than is used in England.

The East River Bridge Cables.

The Board of Trustees of the New York and Brooklyn Bridge have decided that crucible steel must be employed as a material for the wires from which the cables of that structure are to be spun. At the meeting, on Monday last, the president, Hon. Henry C. Murphy, submitted the following report on behalf of the Executive Committee:

The Executive Committee beg leave to report that in consequence of the strong vote of the board on the question of awarding the contract for the wire for the large cables to the lowest bidder for crucible cast steel for that purpose, after the reference to the committee to receive further proposals for Bessemer, they have not deemed it advisable to advertise for such proposals without further communication with the board. They regard that vote, although wanting one of a majority, still as decisive against the use of Bessemer steel, for in so important a matter as the main cables, it would, in their opinion, be unwise to adopt a material which is distrusted by any considerable portion of the trustees. The question of cost is an important one, but is subordinate to that of safety, and the difference of expense between the two is comparatively too small to permit such difference to prevent unanimity and entire confidence. They therefore offer a substitute for the resolution heretofore submitted by them, and recommend that the contract be awarded to the lowest bidder for crucible cast steel wire, upon the condition therein stated, and that the resolution adopted at the last meeting, instructing this committee to receive further proposals for Bessemer steel wire be rescinded as follows:

Resolved, That the contract for the steel wire for the large cables, as provided in the specification issued for that purpose, be awarded to J. Lloyd Haigh at 8 7-10 cents, gold, per pound, he being the lowest bidder for crucible cast steel wire, provided he furnish that kind of wire stipulated in his communication of this board, dated January 9, 1877.

Resolved, That the resolution adopted at the last meeting of the board, instructing the Executive Committee to receive proposals from manufacturers who may choose to bid for Bessemer steel be and the same is hereby rescinded.

After some discussion the report of the committee was adopted, and a resolution awarding the contract to Mr. Haigh was adopted with only one dissenting voice. We hope this will end the discussion. The board are evidently determined to discharge faithfully the great public trust committed to them, and in deciding in favor of cast steel they have not made a

mistake. It is probable that Bessemer wire would have answered, but in a structure of this character the best material obtainable should be used, without regard to the possible saving of \$150,000 or so on first cost.

The Protest of the Steel Manufacturers.

On page seven of this issue will be found a protest of the steel makers of the country addressed to Mr. James M. Swank, secretary of the American Iron and Steel Association. The protest grows out of the discussion of the question of how certain grades of steel of low carburization should be classified for appraisement by the customs inspectors. It appears that lots of such steel have been entered at the port of Boston as iron, and against a continuance of this practice the steel manufacturers of the country make a vigorous remonstrance, supported with a number of good reasons why such grades of metal should not be entered as iron. Boston collectors of customs have a reputation for liberality, amounting almost to looseness, in the appraisement of steel which is very satisfactory to the importers, no doubt, but not altogether in accordance with the letter or spirit of our revenue laws. We admit that the importer should be allowed all the advantages he can claim under a fair, and even a favorable, interpretation of the law, but when he is permitted to bring in steel as iron and pay duty accordingly, he gets rather more advantage than is wholesome, and a great deal more than he has any right to expect. If our law imposes too high a duty on low steels, that is one thing; but to permit their importation as iron is quite another.

Meeting of Stove Manufacturers.

(Special Dispatch to The Iron Age.)

TROY, N. Y., Jan. 17, 1877.

The National Association of Stove Manufacturers opened its sixth annual session in this city to-day, the president, Mr. S. S. Jewett, in the chair. The attendance is very large. The president read an important address, after which the election of officers for the ensuing year took place, resulting in the re-election of the old officers. The question of long credits and other abuses of the trade was discussed at some length, and important action is expected during the session to-morrow. This afternoon at 3 o'clock the members were entertained at the Troy Club House.

For some time past our manufacturers of war materials have been in receipt of large orders from both Russia and Turkey for small arms and cartridges. Russia is also taking our machinery. A set of American rifle machines has been set up in one of the Russian arsenals and is now being driven to its capacity. The number already manufactured in Russia by machinery purchased by General Gortoff from Colt's Rifle Company is estimated at 3,000,000. Russia has also, during the past year, imported from another American firm 100,000 pistols. There has likewise been perfected in America what is now called the Russian cartridge—20,000,000 of which have been made in Bridgeport, Connecticut. Cartridge machinery has also been sent from America to Russia, and 400,000 cartridges are being manufactured daily at St. Petersburg and Moscow. The Turkish government have entered into a contract with the Rhode Island company for the supply of 800,090 Martini-Henry rifles, of which 250,000 have already been shipped, 100,000 more are ready for export, and materials for another 100,000 are on hand at the works. It looks now as if America had become the world's armory. In the event of a general war in Europe, or even of a general war preparation, we should be overcome with orders which it would tax even our own large capacity to fill.

The annual circular of Dunn, Wiman & Co., of Montreal, commercial agents, shows that the commercial stagnation has been very severely felt in Canada. In 1876 the failures amount one for every thirty-two persons doing business in Canada and the provinces. In the United States the ratio was one to sixty-nine. The cause of this state of affairs in Canada is said to be overtrading. There has been an undue crowding of the distributive industries and a proportionate withdrawal of capital and labor from production. Added to this we have the failure of crops this year in the principal agricultural districts north of the great lakes, which has deprived a large part of the population of the means of purchasing to the extent of their average requirements. Trade is dull enough here, but it must be a great deal worse with our neighbors.

From the analogy in chemical properties, existing between the metals nickel and cobalt, it has been thought probable that by employing in the battery the cobalt compounds corresponding in chemical constitution to those successfully employed in the process of nickel-plat-

ing, a similar deposition of cobalt should be obtained. This has been confirmed by the *Jahresbericht d. phys. Vereines in Frankfurt*, where it is affirmed the most beautiful cobalt plating may be obtained upon brass and copper, by employing in the battery—with two Bunsen cells—a moderately concentrated solution of the double chloride of ammonium and cobalt. This solution is prepared by dissolving 40 grammes of crystallized chloride of cobalt, and 20 grammes of chloride of ammonium, in 100 cubic centimeters of water, with the addition of 20 cubic centimeters of ammonia. This cobalt deposit takes place rapidly, and attains in a short time such a thickness that a magnetic needle is decidedly affected by it.

Furnace Capacity and the Outlook for the Iron Trade.

To the Editor of The Iron Age—DEAR SIR: A somewhat extended intercourse with "iron men," and particularly since the effects of the last three years' depression have been most severely felt, has caused your correspondent to notice so distinctly the difference between the practical and the ideal "iron men," that he believes you will not object to giving him a hearing on a point of the most vital interest to the trade.

Shall we assert that the trade was overdone, and the most substantial and reliable portion of it brought to that state of despondency which it now occupies by enthusiasts who were not fitted for the business? Why not?

Do not most of the long established producers remember the frequent consultations which were held during 1870, '71 and '72, which consultations resulted in the decision that business was going ahead too rapidly?—that the means of production were being created far more rapidly than the demands of consumption required? and that it was but a question of time how soon the activity then prevailing would receive a disastrous if not a fatal check?

Then the question occurs, if these are the facts, how has it transpired that the production, and the facilities for the production of iron in its various commercial forms, have become too great for the wants of this country, or to make the business profitable? The writer takes the privilege of saying briefly that the disaster (or give it any other name, if you please) was largely aided if not entirely precipitated by the addition to the working force of men and capital which before had not been connected with the work, and which for want of knowledge of the work failed to comprehend its true nature and extent. But being attracted by the dignity and commanding position of ironmasters, and being ambitious to lead while the power seemed to be in hand to obtain a leading position, this element stepped into the practical ranks in such manner as to at first stimulate and later depress the business by a surplusage of power.

Thus it will be remembered that capital which could not before be employed in the iron business, and the energies of men new to it, became the agencies by which furnace and rolling mill power was increased, by which new iron mines were opened, and the management of these enterprises was attended by an enormous additional cost. Herein was the mistake, from first to last; and it seems the most wonderful thing in the history of so great an interest in any country, that, though discovered and promulgated by a few, it was not made the guide for all, and that the fiction should not have been checked before it reached the magnitude which finally caused so complete an overbrow of the entire interest. The other continent shared with this one in the enthusiasm, which was probably the great stimulant that actuated the sudden employment of so much additional capital in the business in this country; and that content now coming to and sharing the same grief with this makes the case one to be more greatly deplored, whether for want of knowledge, undue enthusiasm, or a prevailing love for action in business.

Now, however well these facts ought to be understood, yet from the beginning of the financial panic which has affected the iron trade so greatly, ironmasters, old and new, of a certain class, have been trying to bolster their hopes and fears and weakened circumstances with promises, made to themselves and the world, that business would soon assume its old supremacy and be as good as when all this superfluous manufacture of iron to make a superfluous quantity of iron seemed to invite capital, enterprise and mechanical skill to its fullest extent. One year, it was first thought, would settle the difficulty, and then two, at most. But now three have passed, and the trade seems further from the realization of its ideal business prosperity than in the beginning.

Next, the point the writer desires to make, in an especial connection with the subject, is the mistake which ironmasters are making concerning the reduced consumption of iron now as compared with a few years ago, or a reduction in the demand for iron. There is no absolute reduction of consumption legitimately. The trade is simply assuming a new form. We assert as a fact which will be acknowledged after a little consideration, that aside from a railroad spur or two during 1862, and the increased demand which was occasioned by the building of furnaces and rolling mills, and adding to the increased facilities about that time created for the manufacture of too much iron, that the trade ought to be as good as it was in 1870, when people engaged in it considered themselves safe.

It should be remembered, too, that as in the rail business old rails take the place of pig iron, that the scrap or junk of many years' accumulation is being utilized in the production of merchant iron in its various forms, and that if the demand for pig is not so great now as a few

years ago, the absolute demand for iron is not much if any less on account of the substitutes for pig.

The facts are—and the sooner they are realized the sooner will the trade be benefited—the pig and rolling mill capacity is far too great for the demands of the country, and it is safe to predict that so far as the furnaces are concerned, not more than one half of them now standing will ever again be used at a profit. The large and elaborate furnaces must take precedence of the smaller ones, on account of their greater capacity; the smaller ones must also give way to the advantages which capital can influence against them in the obtaining of raw material. And, all in all, it cannot be proved, through any evidence now foremost, but that the iron business is not in as fair a condition as it deserves, considering the abuse which has accompanied its management, nor but that the concerns which can run at all ought not to be thankful that they are not of the general wreck. IRONMASTER.

On the Temper of Steel.

Messrs. Miller, Metcalf & Parkin, in their "New Year Circular," just issued, give the following useful hints on the temper of steel:

Since the issue of our circular showing the proportions of carbon in our steel, and that the relative amounts of carbon in any ingots could be determined accurately by inspection, we have received inquiries which lead us to believe that it would be advisable to give some explanations of temper, and also of tempering.

The word temper, as used by the steel maker, indicates the amount of carbon in steel; thus, steel of high temper is steel containing much carbon; steel of low temper is steel containing little carbon; steel of medium temper is steel containing carbon between these limits, &c., &c. Each number of our carbon circular represents a temper, and beside these numbers we use intermediate ones, amounting to some twenty in all. As the temper of steel can only be observed in the ingot, it is not necessary to the needs of the trade to attempt any description of the mode of observation, especially as this is purely a matter of education of the eye, only to be obtained by years of experience.

The act of tempering steel is the act of giving to a piece of steel after it has been shaped the hardness necessary for the work it has to do. This is done by first hardening the piece, generally a good deal harder than is necessary, and then toughening it by slow heating and gradual softening until it is just right for work.

A piece of steel properly tempered should always be finer in grain than the bar from which it was made. If it is necessary, in order to make the piece as hard as is required, to heat it so hot that after being hardened it will be as coarse or coarser in grain than the bar, then the steel itself is of too low temper for the desired work. In a case of this kind the steel maker should at once be notified of the fact, and could immediately correct the trouble by furnishing higher steel.

If a great degree of hardness is not desired, as in the case of taps and most tools of complicated heat, and it is found that at a moderate heat the tools are too hard and are liable to crack, the smith should first use a lower heat in order to save the tools already made, and then notify the steel maker that his steel was too high, so as to prevent a recurrence of the trouble. In all cases where steel is used in large quantities for the same purpose, as in the making of axes, springs, forks, &c., there is very little difficulty about temper, because, after one or two trials, the steel maker learns what his customer requires and can always furnish it to him.

In large, general works, however, such as a rolling mill and nail factory or large machine works or large railroad shops, both the maker and worker of the steel labor under great disadvantages from want of a mutual understanding.

The steel maker receives his order and fills the sizes of tempers best adapted to general work, and the smith usually tries to harden all tools at about the same heat. The steel maker is right, because he is afraid to make the steel too high or too low for fear it will not suit, and so he gives an average adapted to the size of the bar.

The smith is right, because he is generally the most hurried and crowded man about the establishment. He must forge a tap for this man, a cold nail knife for that one, and a lathe cutter for another, and so on; and each man is in a hurry.

Under these circumstances he cannot be expected to stop and test every piece of steel he uses and find out exactly at what heat it will harden best and refine properly.

He needs steel that will all harden properly at the same heat, and this he usually gets from the general practice among steel makers of making each bar of a certain temper, according to its size.

But if it should happen that he were caught with only one bar of, say, inch and a quarter octagon, and three men should come in a hurry, one for a tap, another for a punch, and another for a chilled roll plug, he would find it very difficult to make one bar of steel answer for all of these purposes, even if it were of the very best quality.

The chances are that he would make one good tool and two bad tools; and when the steel maker came around to inquire he would find one friend and two enemies, and the smith puzzled and in doubt as to whether he ought to get mad or not.

There is a perfectly easy and simple way to avoid all of this trouble, and that is, to write after each size the purpose for which it is wanted, as for instance: Track tools, smith tools, lathe tools, taps, dies, cold nail knives, cold nail dies, hot nails, hot or cold punches, shear knives, &c., &c. This gives very little trouble in making the order, and it is the great-

est relief to the steel maker. It is his delight to get hold of such an order, for he knows when it is filled that he will hardly ever hear a complaint.

Every steel maker worthy of the name knows exactly what temper to provide for any tool, or if it is a new case one or two trials are enough to inform him, and as he always has all of his twenty odd tempers on hand it is just as easy—and far more satisfactory to both parties—to have it made right as to have it made wrong.

For these reasons we urge all persons to specify the work the steel is to do, then the smith can harden all tools at about the same heat, and he will not be annoyed by complaints or hints that he does not do his work well.

Please hand this to your smith and ordering man for preservation, and we will follow it shortly with some of the results of our experience in hardening and tempering various sizes and forms of tools.

Another Failure of the Block System.

The London *Engineer* comments as follows upon the latest failure of the block system:

The block system has once more failed a railway company in their need; and a disastrous accident is the result. On the 23d of December the down Great Northern express train when near Arley, 35 miles from London, ran into a coal train. The driver and stoker jumped off and were both killed on the spot, and the train was thoroughly smashed up and both lines blocked. The coal train came to be in the way in this wise. At 3:30 p. m. it arrived at Arley, and the signalman, having blocked both lines, which he could not help doing, at once proceeded to shunt it into a siding out of the way of the express. All would have gone well, but that unfortunately some trucks got off the rails, and so the train fouled the down line. The moment the signalman found this to be the case he rushed to his telegraph instrument to warn the signalman at Cadwell, about two miles off, but at the same moment the Cadwell man gave "train on line." As both the home and distant signals at Arley were at danger, there was apparently no ground for apprehension. But it would seem that the signalman at Arley had small faith in the machinery which he operated, for he snatched up a red flag, threw it to a plate layer, and told him to run up the line as fast as he could and stop the express. We shall say nothing of the compliment thus paid to an elaborate and costly signaling apparatus. An experienced man—he has been signalman at Arley for eight years—placed more confidence in a red flag than he did in his semaphores. However, the plate layer had not time to be of use, and the train dashed through the signals, and the accident occurred.

An inquest and a Board of Trade inquiry before Capt. Tyler are both in progress, so that we are not at liberty to pronounce any decided opinion as to the cause of the accident; but there are certain facts available which the journalist may as safely and as prudently use now as in a year hence. We shall proceed to point these out. In the first place, the Great Northern line is working on the absolute block system, with interlocking gear, and consequently this accident should not have occurred. In the second place, Mr. Cockshot, the general manager of the line, was on the platform when the train started, and specially warned poor Pepper, the driver, a man of large experience, to be careful, as it was Christmas time. In the third place, it seems that Pepper was careful, for, although the accident happened, he was heard whistling for brakes long before—seconds are long at such moments—the smash. It will be seen further, that in this case we have none of the old elements of doubt. The signalman had done his best. The semaphores were put at danger. All that the block system could do to prevent an accident, it had done, and an accident took place. Whenever the block system fails, an excuse is found for it. At Abbott's Ripton a snow storm was in fault; in other instances the signalman is to blame. Here only two causes can be assigned for the accident. Either the driver and fireman of the express did not see the signals against them, or, seeing them, they were unable to stop their train in time. As they were both killed it is impossible to hear their evidence. Now, we have not the slightest doubt that the advocates of the block system will say that the system is perfect, but that its utility was impaired by the neglect of the driver. But the utility of the block system is constantly being impaired in this way by the neglect of drivers and signalmen, and by snow-storms, and want of oil, and the stretching of wires, and other adverse influences too numerous to mention—impaired so much that many railway men begin to believe that it is incapable alone of preventing accidents. In the case of the Arley collision it will be seen that an admirable parallel may be found for that at Abbott's Ripton. In each the signalman endeavored to throw the work of stopping the train rushing to destruction, on the man just before him in the direction in which the train was coming. Thus, if the Abbott's Ripton signalman had been in time, it is assumed no accident would have occurred; and in the same way Graves, at Arley, tries to stop, at Cadwell, the train which he fears. Now, if the system really worked, as it is claimed for it that it does work, then each man ought to be able to act for himself, and Graves ought to have been quite certain that he could stop the train. That he was not certain is proved by his sending a plate layer to supplement his signals, and that his fears were justifiable is proved by the collision.

It will be urged that the collision took place because too short an interval intervened between the shunting of the goods train and the arrival of the express. The sooner this line of argument is dismissed forever from the pages of the press the better; and we are pleased to find the *Times* taking the sensible and accurate

view, that short intervals of time only can be allowed for shunting on crowded lines. A system of working trains which will not permit short intervals of space between each train is useless. We are by no means disposed to assert that the block system is so bad that it should be dispensed with, and that railway men should resort to the old time interval, keep a good look out for tall lights, and trust in Providence. But we do reassert here what we have asserted before, that the block system requires to be supplemented by something else, and that the misplaced confidence which has been placed in the exaggerated merits of the device has done a great deal to retard the progress of improvement in the working of railways. It has now been proved by four great accidents—that at Abbott's Ripton, that at Thorpe, that at Radstock, and now this at Arley—that the block system must, to be efficient, be supplemented by some satisfactory method of stopping a train. The signals can only tell drivers to stop, and are worse than useless if these cannot stop, because they lull men into a false security. Until all the facts are before us it is impossible to say whether any continuous brake would have obviated the Arley collision. But it is at least possible to prove that the speed of the train would have been greatly reduced. In the same way at Abbott's Ripton lives would have been saved, and thousands of pounds of property preserved to the company, if the down express had been fitted with a continuous brake. Dozens of examples of the same truth may be cited by any railway man who has his notes by him. The only question now remaining to be dealt with is, How many more collisions are to take place before railway companies begin to understand that when they have provided powerful engines to haul a train at high speed they have done but half their work, and that an efficient means of taking the velocity out of the train in the smallest possible space of time is just as much needed?

Rattening in the Sheffield Saw Trade.

The *Ironmonger* says: The most glaring case of rattening that has been known in Sheffield since the Trades' Outrage Commission sat there in 1867, has been committed this month. It is a matter of history that the notorious William Broadhead was the secretary of the Saw Grinders' Union, and that it was in connection with this trade some of the most diabolical outrages that disgraced the town were committed. Again the alleged action of that union has attracted public attention. Messrs. Yates & Wood, saw manufacturers, whose works are in Wicker Lane, have in their employ a man named Thomas Peace. Work is given out to him, and he employs his own men to help him to do it. He has had working for him two union men, a unionist named Broadhead, relative of the well known William, and an apprentice. Formerly Peace himself belonged to the union, but he severed his connection with it. After standing aloof for a time he applied to know on what terms he might be reinstated a member. He was told by paying a year's subscription a year in advance, and remaining unentitled to any benefit until that period had expired. He refused to submit to those terms, and only once since then has he had any communication with the union, and that was in regard to some unpleasantness with respect to his apprentice. When he went to his work on the morning of December 12 he found that his "wheel" had been entered during the night, and the two long leather bands which drove his machinery had been taken away. A third band which a unionist used had been removed, but was left in the yard. Now it happened that the bands were the property of the firm, and Mr. Wood had Peace and his men before him, and interrogated them as to why they had been taken. They were quite unable to give any explanation, alleging that no communication whatever had passed between them and the union. Mr. Wood appeared to take it for granted that the union was at fault in the matter, and he complained that the bands should have been taken and no reason assigned. The same night two of the men went before the officials of the union and repeated his complaint, and the next morning's post brought Mr. Wood the following explanation:—"Dear Sirs,—With reference to your Bands the Bands have been taken for the pretence laid and Thomas Broadhead, Yours truly Mary Ann." On the other side of the sheet was the following:—"If these means don't act we shall try something else. Mary Ann, powder next." Mr. Wood had no hesitation in concluding that this reply to his complaint had come from the union; and he also knew quite well the significance of it, as the most terrible outrages Sheffield has known had followed similar threats. Mr. Wood determined "to take the bull by the horns," and he wrote a characteristic reply to the "Committee of the Saw Grinders' Union." After complaining that—inasmuch as his firm had never interfered with their men, but had allowed them the fullest liberty to join the union or not, as they might think fit—their bands should be taken in order to compel them to make their men conform to what the union thought proper, he said:—"We shall do no such thing, notwithstanding your polite threat of trying a little powder for the next dose." He also informed the committee that unless the bands were returned he should arrange for the men's contributions to the union to be left with the firm until the new bands were paid for. This reply brought down the union secretary, who was profuse in his assertions that the union had nothing to do with the rattening; but Mr. Wood reminded him that Broadhead had always played that part before the commission sat; and told him that the union could blow up their works as soon as they liked, as he was not unused to the smell of powder. The firm were determined to abide by their principle of non-interference with their workmen in the matter of unionism. He hoped the bands would be returned, as he did not wish to have further unpleasantness, if they were not sent back within two days he should make public what had passed between them. The bands were not so returned, the correspondence between "Mary Ann" and the firm was published, and the public have not had much difficulty in deciding who were the offenders on this occasion.

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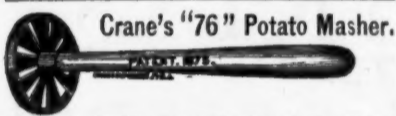
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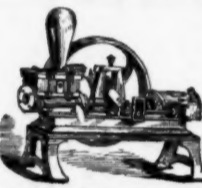


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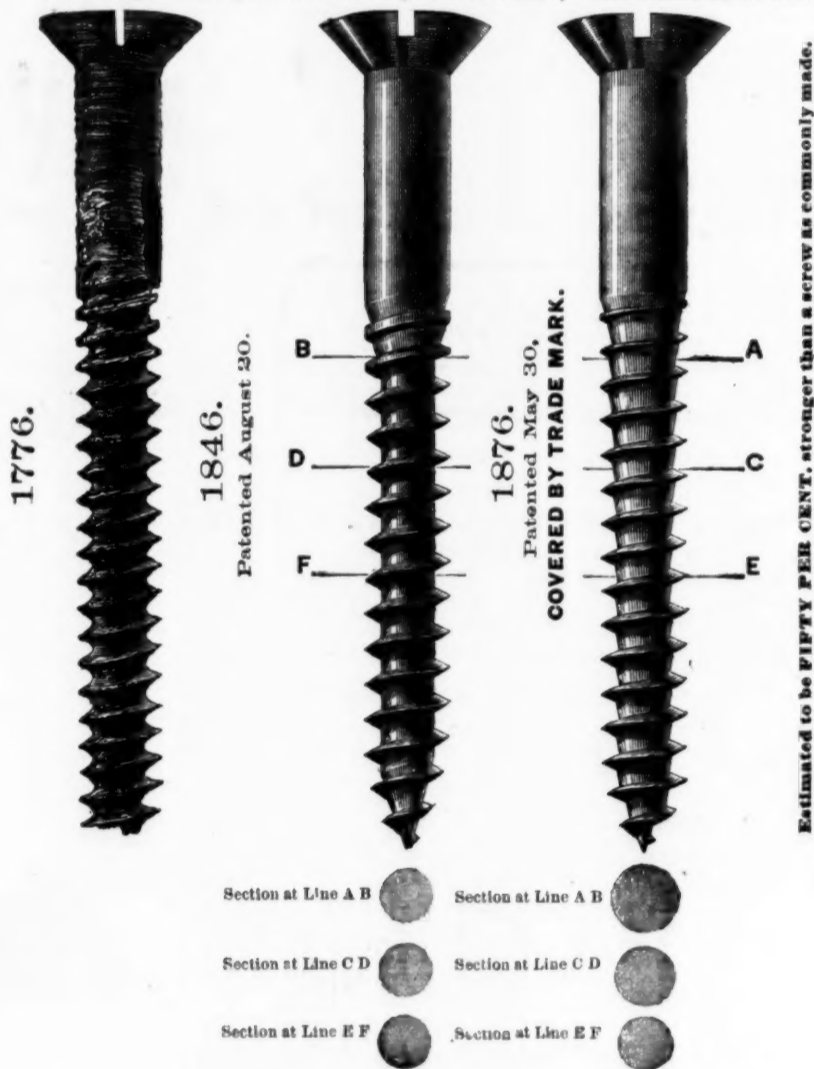


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The method of manufacturing is also patented, and we are changing our
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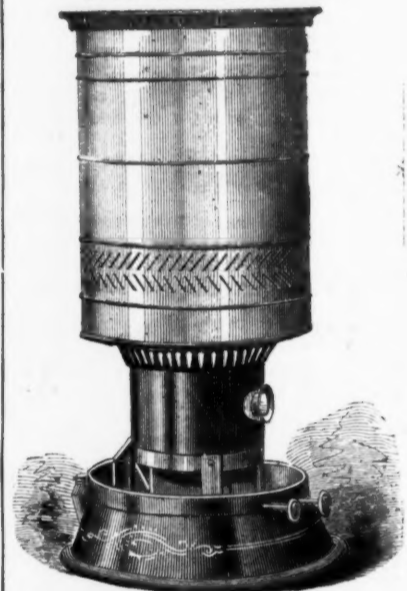
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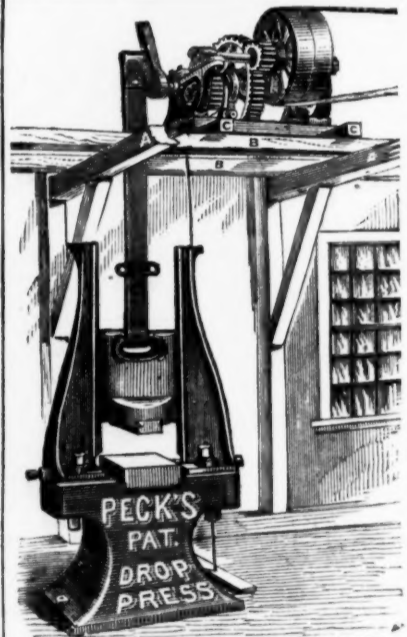


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It requires less power, works faster, gives a harder blow
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mer is caught without lessening the force of the blow,
the blow is uniform and not affected by variations in
the speed of the driver. It is always in order. The
Drop Press a specialty.

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**FISHER'S PATENT
Mowing Machine Knife
GRINDER.**

PRICE,
\$3.00.



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W. R. REGER,
PATTERN AND MODEL MAKER,
Rear of 241 Arch St., Philadelphia.

(Continued from page 9.)
INDUSTRIAL ITEMS.

PITTSBURGH AND VICINITY.

A very pleasant occasion was enjoyed at the office of the Lucy Furnace, New Year's Day. The employees of the establishment presented the superintendent, Mr. H. M. Curry, with a beautiful gold watch and chain as a token of their regard. Mr. Curry accepted the gift in a few appropriate remarks, thanking the donors for their generous liberality.

WEST VIRGINIA.

The lamp black works at Cumberland, owned by John Haworth, were entirely destroyed by fire Sunday night, 24th ult. The loss will not fall short of \$30,000, and is partially covered by insurance.

VIRGINIA.

The Elizabeth Furnace property has been purchased by some Western Pennsylvania capitalists, and arrangements are being made to mine ore largely. Mr. Thos. S. Blair, of Pittsburgh, is in charge of the work.

GEORGIA.

The Diamond Furnace, Cartersville, is still running on ferro-manganese.

The Rogers Furnace, Rogers Depot, Bartow county, is about to blow in. It is a cold-blast charcoal furnace, 36x9, with an annual capacity of 2500 tons.

OHIO.

The Kenton Iron Fence Company, of Kenton, are about removing their works to Pittsburgh, where they will largely increase their facilities for manufacturing their several new styles of ornamental iron fence. These new patterns have been exhibited at the Centennial and other expositions and received highest premiums. The officers of the company are: Mr. Henry Price, of Kenton, president; Mr. E. Crawford, of Pittsburgh, treasurer; and Mr. James Young, of Kenton, secretary. The works will be situated in Allegheny City, and their offices and show-rooms in Pittsburgh.

The mill at Ashtabula and that of the Niles Iron Co., at Niles, is run on the co-operative plan, the men receiving half pay, and if at the end of a definite period the mill has made any money they get a dividend.

The La Belle Glass Works, Bridgeport, shut down on Saturday, the 23d ult., for two weeks.

A roll in Brown, Bonnell & Co.'s plate mill, Youngstown, was broken Friday night, the 23d ult., and another was broken Saturday, the 24th ult. These accidents occurring at a time when the company is pressed with order, make it necessary for the other rolls to be kept running extra time.

The Aetna Mill, Bridgeport, will start up after the holidays with renewed vigor.

Aetna Furnace, Ironton, is running on Sheridan coke and native ore, and is doing well.

OHIO.

The Lawrence Mill, Ironton, is idle still, and will probably not start until the middle of the month.

Both the Belfont and Ironton mills, Ironton, are in full operation.

Howard Furnace is using coke made from her own coal, and doing very well.

The Zanesville Furnace will be blown in sometime in the spring.

The XX Furnace in the new Stratsville region will be blown in during the present month.

The Columbus Furnace will be taken down the present year and moved to Perry county.

MICHIGAN.

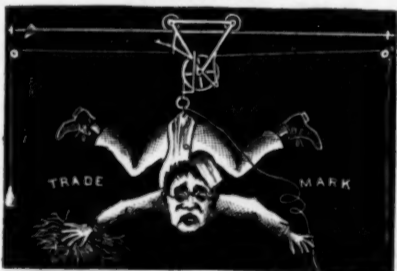
The two smoke stacks of the Rolling Mill Furnace, which were blown down a short time ago, have been replaced, and the furnace has again assumed its natural appearance, smoking as before, and making the usual amount of iron. The Fayette Furnace was badly damaged by fire on Friday night, the 15th. As nearly as we can ascertain, one of the arches gave out, and the iron breaking out over the dam, set the whole concern on fire. The damage is estimated at from \$30,000 to \$50,000. We are unable to say how long the accident will keep the furnace out of blast.—Marquette Mining Journal.

WISCONSIN.

The Milwaukee Mills have been entirely idle since spring.

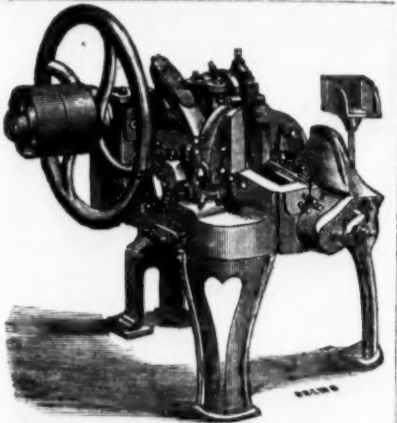
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Machine.



For raising any weight and depositing the same in any desired place. Furnished to the wholesale hardware trade only by the patentee and sole manufacturer
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4228 Market St., Philadelphia.

Agents wanted in every State. Send for illustrated circular and price list.

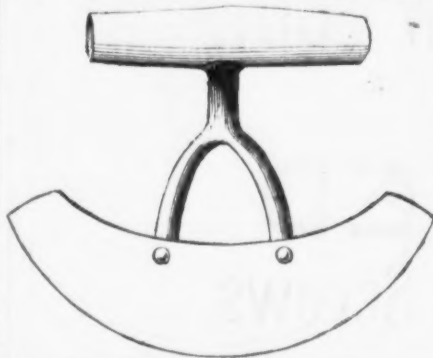


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GEO. DUNHAM, Pres. G. S. KNAPP, Treas. MARTIN COWLES, Sec.



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Square, Round, and Hexagon Head Set & Cap Screws, in Iron, Steel and Brass.

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FACTORY, 46 Green Street, Newark, N. J.

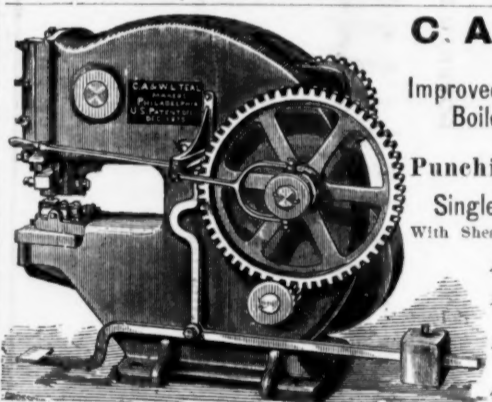
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Rules graduated in foreign measure to order.
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COMBINED
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With Shearing Attachments for Rolling Mills,
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Attachments furnished for punching Nuts
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Rotary Shearing Machines, Steam
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Improved Hair Picking & Clean-
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in the market. They have recently been improved,
making them, as now offered to the trade, the most
perfect tools of their kind, either in design, material
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Metallic Combination

Plow Plane,

Made of solid cast steel and of gun metal. Of an
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The Ausable Nails

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And the Finishing and Pointing are
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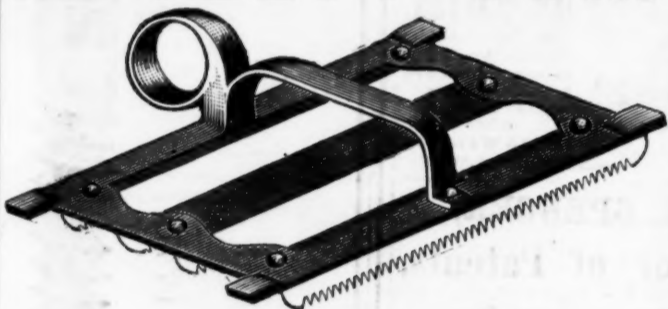
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Sole proprietors of the renowned full concave patent

"ELECTRIC RAZORS,"

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The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make

NICKEL & SILVER PLATED POCKET KNIVES

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Steel and File Manufacturers,
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Granted 1777.

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Hardware Commission Merchants,
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McCOY & COMPANY,

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Young's Patent Folding Scissors.



Fits simile of the small size.

These Scissors are made of the very best steel, nickel plated, and so constructed that they can be readily folded and carried in the pocket without injury to the garments. A sample pair will be sent by mail, to the trade only, upon receipt of the retail price, namely: For small size, either blunt or pointed, \$1.00; Large size, pointed or half pointed, \$1.50. New York, Feb. 1st, 1876.

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Steel in Russia.

That the metallurgy of iron and steel is a branch of industry to which the Russians give a large amount of attention has long been known in this country, yet additional proof of this is given in the exhaustive little memoir communicated to the Russian Technical Society, by Mr. D. Chernoff, the assistant manager of the Abouchoff Cast Steel Works, near St. Petersburg, briefly mentioned in an extract from the London *Echo*, which appeared in a recent issue of *The Iron Age*. The fuller information given below is from a translation of Mr. Chernoff's paper by Mr. W. Anderson, of the Erith Iron Works:

The purer the iron and carbon combined in the steel the higher are its qualities, and Mr. Chernoff adds that the best steel ever made in any age or country is without question "boulat," the saber steel of the Tartars. The special quality of boulat, and especially the markings on its surface have proved misleading; all thought to find the extraordinary qualities of this steel in some special mixtures; careful analyses, however, showed nothing to explain the characteristic veining, which veining is closely connected with its quality. By melting steel with platinum, silver, and so on, veinings were produced, but they were wanting in regularity and beauty, and the steel was always inferior to boulat. Another peculiarity is that if a good specimen of boulat with clearly marked veining be heated to bright red, and then allowed to cool, it will be impossible to restore the meltings, no matter how long you treat the surfaces with acid; but the veining produced by the mixture of metals never disappears however much the steel may be heated. But if the piece of boulat be melted again, then, if certain conditions in the cooling of the ingot be observed, the veining appears again, though of a somewhat different design; in this manner it is possible to produce or annihilate the pattern several times.

The number of valuable conclusions put forward in the pamphlet is very large. It has been found that if steel melted in a crucible be constantly kept in violent agitation while cooling, agitation violent enough to keep all its particles in motion, then the cold ingot produced will have a very finely crystallized structure; if, on the other hand, the melted steel is allowed to cool in perfect quiet then the resulting casting will consist of large well developed crystals. The appearance of these crystals, and generally the tendency to crystallize under these circumstances, will depend on the purity of the steel. It is contended that the ultimate purity of the steel depends upon that of the iron and carbon forming it, and that the best steel is composed of only these two elements. The opinion of Frey that nitrogen is essential to the existence of steel is declared to be not supported by the most careful researches—for, on the one hand, nitrogen is found also in soft wrought iron and in cast iron, and, on the other, the quantity of iron found in steel is very variable, and bears no fixed relation to the quantity of carbon; and, furthermore, it exists in such small quantities as to be less than a tenth part of the carbon. With reference to the influence of different metals on the quality of steel it is explained that some of them communicate a particular color, some diminish the tendency to rust, and others, displacing the carbon, enable the steel to acquire very great hardness in tempering and so on; but the greater number of substances combined with steel even in the most insignificant proportions very considerably lower its quality. Speaking generally, all the efforts of metallurgists to obtain the highest qualities of steel should be directed to separating impurities from the raw materials, so that the produce of their operations should be a combination of iron and carbon; and all the specifics and nostrums forming the subject of so-called secrets will be found to consist in effect not in the introduction of new materials, but in purifying the raw, and only, as a last expedient, driving out pernicious impurities by means of substances less harmful.

Steel, then, cast and allowed to cool quietly assumes a crystalline structure. If such an ingot be heated bright red and allowed to cool without working it in any way then, on breaking the mass, it is found that its structure has been altered. To explain the law of change of structure by heating, a scale is made with marks corresponding to several determined temperatures. In this scale, *a* is the thermometric zero; *a* may be either red; *b*, red, but not dark; and *c*, the melting point of a given sample of steel. The points *c*, *b* and *c* have no permanent place on the scale, but vary with the quality of the steel. Thus:

No change of structure.	Rising from <i>b</i> to <i>c</i> , amorphous structure.
Will not harden.	Falling from <i>c</i> to <i>b</i> , crystallization.

In pure steel this variation depends directly on the quantity of carbon contained; the harder the steel the nearer these points move to *a*, and the softer the steel the farther off, and, speaking generally, with varying rates. The limits of these movements are so narrow that an inexperienced eye will hardly discern them. He has been compelled to denote the temperatures by the colors exhibited in heating, the various shades of which only an experienced eye can appreciate, and it must be added that the colors named have reference only to hard and medium quality steel; for in the very soft kinds, nearly approaching wrought iron, the points *a* and *b* recede very far, so that, for example, in wrought iron the point *a* corresponds to white heat. Defining the point *a*, it is stated that steel, however hard it may be, will not harden if heated to a temperature lower than *a*, however quickly it is cooled; on the contrary, it will get sensibly softer and more easily worked with a file. The definition of the point *b* is that steel heated to a lower temperature than *b* does

not change its structure whether cooled quickly or slowly; this expression, however, must be taken conditionally, because steel during long periods of time, and especially under the influence of shocks or vibrations and at ordinary temperatures, but to a not than wrought iron, changes from the finely granular to the coarse crystalline structure; and as regards the heated and, therefore, softened condition, and especially at temperatures approximating to that indicated by the point *b*, it is probable that with the greater facility of motion the change of structure will take place more rapidly. He has himself kept steel at a temperature near *b* for eight hours without being able to detect any change of structure. When the temperature goes above *b* the steel quickly passes from the granular or crystalline to the amorphous or wax-like structure, which it retains up to its melting point, which the point *c* represents. In this condition steel is incompressible, and with respect to permanence of amorphism has an analogy to an exceedingly concentrated solution of a strongly crystalline salt. If such a solution be allowed to cool very slowly and in perfect quiet then large regular shaped well developed crystals will be formed, but if with the same gradual cooling the liquid be kept constantly shaken up the crystals will come out very small. Allowed to cool quietly the crystals will also be small; and, finally, the least favorable condition for crystallization is when the liquid cools rapidly, and is, at the same time, violently agitated. It is found that the same changes take place in the structure of steel heated above the point *b*. The higher steel is heated the softer it becomes; the greater, therefore, is the liberty its particles possess to group themselves into crystals if the quiet of the mass be not disturbed by extraneous forces, and the slower the temperature is suffered to fall to the point *b* the more time they have for the purpose. In fact, liquid really obeys the usual chemical laws of crystallization, so that it is really in the control of the manipulator to produce any kind of steel from the hardest crystalline to that of the finest silky texture.

Mr. Anderson has rendered much service to steel manufacturers in translating the paper, and his labors will, doubtless, be largely appreciated.

Railway Freight Rates.

Another advance in Eastward-bound freight rates, equal to 5 cents upon each 100 pounds from Chicago to New York, has been agreed upon, to take effect next Monday. This will make rates on fourth-class freights and on grain and flour, from the points named to New York, as follows:

	Fourth Class.	Grain and Flour.
Chicago.....	45	40
Cincinnati.....	39	35
Cleveland.....	33	30
Detroit.....	40	36
Evansville.....	48	42
Fort Wayne.....	40	36
Indianapolis.....	33	30
Indianapolis.....	43	37
Louisville.....	47	42
Quincy, Ill.....	54	47
Sandusky.....	35	31
St. Louis.....	50	45

No change has been made in rates on Westward-bound freight, and information obtained from trustworthy sources confirms the report that very little freight has been shipped West at the rates established Dec. 18, 1876. Many of the contracts at the low rates existing before the recent agreement was signed have not yet expired, and regular shippers, it is positively stated, have no difficulty in renewing the contracts that expired with the first of the year at the old rates. An occasional shipper forwarding a small quantity of goods, or a new firm that is not well informed as to the condition of affairs, may pay, it is stated, the new schedule rates, but these constitute the exception instead of the rule. The claim of the merchants is to the effect that it would be very unjust to discriminate among the regular customers of the different trunk lines against certain shippers whose contracts happen to have expired before those of their competitors, and they unhesitatingly demand, as the price of their patronage, that they shall have rates as low as anyone. A large portion of the shipments from the West, it is also stated, are made on "old" and "new" contracts which have not expired, and the only renewal at the time of expiring as those to the West is because the railroads are not supplied with equipment sufficient to carry the grain and other produce that is offered in the West, and consequently they are somewhat better able to maintain the advance in rates. When the present blockade is removed, it is asserted, it will be no easier to maintain the advance in rates in Chicago than it now is here.

Although it was confidently asserted a week ago that a meeting of the foreign freight agents of the different trunk lines would be held at once, and that rates on through bills of lading between the principal points in the West and Europe would be established, no such meeting has yet taken place, and the agents of some of the lines, it is stated, have not yet received their instructions in regard to the matter. No rates have been established on through bills of lading, and no notice of an application for a rebate on goods shipped to this port and subsequently reshipped to a foreign port has been given to the several parties to the recent compact.

If the United States does not develop a great trade with the Empire of Brazil it will not be for lack of encouragement by Brazil. Another step is being taken in the direction of closer relations with this country under the auspices of Brazilians. It is now proposed to establish in the city of New York an agency to be called The Imperial Brazilian Bureau. Its object is to bring the Empire of Dom Pedro and its resources before the people of this country, and "to invite, stimulate, and encourage American merchants, planters, and manufacturers to establish in the Empire commercial, agricultural, and industrial enterprises."

Novelties in Saddlery Hardware and Hames.

The Eberhard Manufacturing Company has recently been formed at Pittsburgh for the manufacture of the Eberhard hollow malleable iron hames, saddlery hardware and carriage trimmings. The establishment is under the personal management of Mr. Eberhard, who was formerly well known in connection with the Akron Hame Works, at Akron, O. Since the closing of the works at Akron, Mr. Eberhard has given his attention to a number of new and valuable inventions, which he has recently had patented. One of the most prominent of these is his hollow malleable iron hames for light and heavy harness. Most manufacturers and dealers in this article are aware of the repeated failures which have been made in attempts to get metallic hames sufficiently light and at the same time possessing the requisite strength. Mr. Eberhard, after several unsuccessful attempts, has at last succeeded in bringing out a metallic hame that is undoubtedly a success, it having all the requirements of strength, durability and lightness. The hames are cast in malleable iron, hollow, and of uniform thickness of from one-sixteenth to one-tenth of an inch. They may be plated or otherwise covered, and when finished they are exceedingly neat and light, with all the strength of solid metal of the same size, and fitting the collar neatly from top to bottom. Beside hames, they are manufacturing Eberhard's new patent hame trimmings—a combination of the clip staple and breast ring staple. This valuable device is applied to the hame without drilling or cutting away its body, and entirely prevents the wearing of holes in the collar. They also make Eberhard's patent hame loop, trace buckles, bridle trimmings and harness snaps. Their "National" harness buckles are very complete, being adjustable and attached to the leather entirely without the use of stitching or riveting. This device was patented Sept. 1st, 1875, and Oct. 3, 1876.

We saw Mr. Eberhard make a hitching strap, mounted completely with snap and buckle, in less than half a minute, taking less time than would be necessary to prepare a wax-end. They manufacture some thirty different patent hames and carriage trimmings. These goods are finished in Japan, XX silver, brass, nickel, oroid, silver and gold plated, as the trade may demand, at the works of the company in Allegheny City, where no pains are spared to bring them up to the highest standard in quality and finish. The works are running full on orders booked some time ahead. The company are about to publish an illustrated catalogue, showing a full assortment of cuts of their new goods.

Special Notices.

A PORTION OF OUR EDITION OF 28th OF December having been destroyed in the railroad disaster at Ashtabula, Ohio, those of our subscribers who have not received that number will be furnished a copy upon application, until our supply on hand is exhausted.

Situation Wanted

as Bookkeeper, Salesman or Traveling Agent, by a man who has been in Hardware Jobbing and Retail Trade in above capacities, for sixteen years.

Address, **HENRY LUDWIG,**
75 Lake St., Chicago, Ills.

Engine and Boilers For Sale.

One Starbuck 14x36 Engine, with variable cut-off
One Pitkin Bros. Boiler, stationary, 4x15 feet.
One Locomotive Boiler, 4x15 feet.
New Heaters, Steam Pipes, Smoke Stacks.
All in good order.
For further particulars inquire of
J. H. ALLEN, Eagle Mills, N. Y.

RESIDENT BUYER.—A gentleman of more than twelve years' experience in the general hardware business, and for several years past acting Eastern with entire stock of one of our large to act as buyer for a few, will make arrangements respondents. Thoroughly understands the requirements of both markets, and being constantly in communication with all Eastern manufacturers, offers his services in this behalf. Best of references furnished. Address **G. U. S.,**
P. O. Box 4743, New York City.

NOTICE.

The public are cautioned against constructing, selling or using any Screw Machinery employing the inventions or improvements described in the following Letters Patent of the United States:

Letters Patent No. 42,756, for improvements in machinery for nicking the heads of wood screws, granted to H. A. Harvey, May 17th, 1864.

Letters Patent No. 42,756, for improvement in machinery for cutting thread upon wood and other screws, granted to H. A. Harvey, May 17th, 1864.

AMERICAN SCREW CO.

I am prepared to make arrangements with Eastern manufacturers to act as their agent for the sale of Hardware, etc., on the Pacific Coast.

CHARLES OTTO,

(Established 1854.)

Importer & Dealer in **HARDWARE,**
Manufacturers' Agent, etc

312 Bush St., San Francisco.

REFERENCES:

Sargent & Co., 37 Chambers Street, New York.
Van Wagoner & Williams, 82 Beekman St., N. Y.
F. Hessebruch & Co., 10 N. 5th St., Philadelphia.
The Pennsylvania Tack Works, Norristown, Pa.
Pacific Bank, San Francisco.

Special Notices.

BOOKS.

Any of the following Books will be sent, postpaid, upon receipt of price, by

DAVID WILLIAMS,
10 Warren St., New York.

IRON MANUFACTURE IN AMERICA.

A CONCISE HISTORY
OF THE
IRON MANUFACTURE OF THE AMERICAN
COLONIES
Up to the Revolution,
AND OF
PENNSYLVANIA UP TO THE PRESENT TIME.
By JOHN B. PEARSE,
Metallurgical Engineer, Commissioner of Geological Survey of Pennsylvania, &c.
PRICE, POSTPAID, \$2.00.

This book is written with a view of collecting and publishing in an interesting form all accessible facts relating to the localities, methods and costs of the manufacture of iron in the different colonies up to the close of the Revolution, and in Pennsylvania from the year 1717—the date of the inception of the trade in this country—to the present time. The work thus includes all the most interesting changes and improvements that have been made.

The work is well illustrated, both with views and plans of old works, and matters of interest connected with them. In historical matter the work is brimming over with interesting facts pleasantly told. While the work is intended to be as much for reference as for reading, containing a great quantity of statistical and tabular matter, it is as entertaining for consecutive reading as a history can be made. The account of the recent progress of iron manufacture in Pennsylvania embraces every improvement made in the various processes. A large map shows the location of iron ore, coal beds, and the iron works of the State.

Neither author nor publishers have spared any pains to make the work all that could be desired, in completeness, accuracy and interest.

Practical Assaying.

Notes on Assaying and Assay Schemes. By Pierre de Peyser, E. M., Ph. D., Instructor in charge of Assay Laboratory of the School of Mines, Columbia College.

This little manual embodies the system of Assaying practiced in the School of Mines, with valuable additions, tables, etc., and has been prepared with special reference to the wants of the student and assayer. Chemical names and formulas, where necessary, have been given in parenthesis and in the Appendix, in order to simplify the book.

The work is fully illustrated, and much attention has been paid to the details and methods peculiar to the West, many of the latter having been tested in the laboratory and the results given.

PART I. Apparatus.—Reagents and Operations.
PART II. Dry or Fire Assays.
PART III. Wet Assays, or Analysis.
PART IV. Tables and References.
APPENDIX. Blow-Pipe Analysis.—Apparatus and Reagents.
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Iron Bridges.

A Practical Treatise on Iron Highway Bridges. (Handsomely Illustrated.) For the use of Engineers, Students, Town Committees, and others interested in the subject of Iron Bridge construction. With an essay on the Principle of the Lever applied to a ready analysis of the strains upon the commoner forms of Beams and Trusses. By A. P. Boller, A. M., C. E.

This work is especially designed for the use of Town Committees and those having Highway Bridges to construct. The general reader will also find this work of great interest, discussing as it does in a popular and instructing style the whole theory of bridge building. Numerous engravings and diagrams are used, both in the illustration of good and poor construction. Price, postpaid, \$2.50.

A Treatise on the Resistance of Materials.

And an Appendix on the Preservation of Timber. By De Volson Wood, Professor of Mathematics in Stevens' Institute, Hoboken, N. J. 4 vol. octavo. Price, postpaid, \$3.

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FOR SALE. on easy terms, a Machine Shop, Foundry and Boiler Shop, together with their entire equipment and supplies. The entire property will be sold for \$30,000, title perfect; or the entire may be exchanged for a wholesale stock of Hardware and Cutlery, or a general assortment of Iron and Nails, on fair terms. Location as good as any in the State. For particulars, address,
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Important to Manufacturers.

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Auctioneers and Commission Merchants. No. 15 Murray St., New York.
Solicit from Manufacturers and others consignments of Hardware and Cutlery for our weekly Auction Sales to the Trade, or at private sale for cash, as desired. Our facilities for moving large lines of goods are unsurpassed. Advances made if desired.

MACHINERY &c., FOR SALE.

Having sold our good will and business to the Domestic Sewing Machine Co., we have for sale a large quantity of SECOND-HAND MACHINERY, a stock of sheet brass, sheet and bar steel, wire, &c., at low prices, at our manufactory, corner of Waltham and Washington Streets, Boston.

GROVER & BAKER SEWING MACHINE CO.

For Sale.

A No. 5 Geared Stiles & Parker Press. Perfect order. Quite new. Latest pattern.
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A business man of large experience in manufacturing and trade, accustomed to the management of men and works, desires an engagement in any branch of business or industry. References of the most satisfactory character given.

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EXPORT TO RUSSIA.

We are established at St. Petersburg for the sale of American Machinery, Hardware, Agricultural Implements and technical products generally. We beg to solicit correspondence with manufacturers desirous of being represented in Russia. Familiar with the wants of the trade, and as Civil Engineers being brought in contact with the industrial interests, we are enabled to successfully introduce American products. We are also able to obtain at the lowest rates, patents for any American invention the sale of which is placed in our hands. Address all circulars and price lists to **HARTOCH BROS.,**
Galerna 56, Quart 1, St. Petersburg, Russia.
Any information desired will be furnished by our American correspondents,
Messrs. Pfaffelzer Bros. & Co.,
421 Market St., Philadelphia.

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Having, in compliance with the wishes of our large constituency in the Iron, Metal and Hardware Trades, and in the Manufacturing Industries, added a

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to our regular publication business, we are prepared to send postpaid to any address,

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all classes of Standard and Current Books, including works on

IRON, STEEL AND METALLURGY.
MINING AND ASSAYING.
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60 in. x 12 ft., 42 in. x 12 ft., 34 in. x 6 ft., 22 in. x 5 ft. Lathes, Milling Machines, Drills and Presses.

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for export and the trade; largest stock always on hand ready to ship at notice. Manufacturer of **COMMON SENSE STALK CUTTER,**
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"Everything for the Farm," containing illustrations of 200 of most improved implements of Farm, sent on receipt of 10c.

NOTICE! POND'S TOOLS.

The undersigned has assumed the Personal Property, including accounts, finished and unfinished Machinery, good will &c., connected with the manufacture of **MACHINIST'S TOOLS** as conducted by Mr. Lucius W. Pond since 1847, and will continue the said business at the old stand, cor. Union and Exchange Sts., Worcester, Mass., under the name of **DAVID W. POND, Successor to Lucius W. Pond.**

CARD.—Having assumed the business mentioned above, I solicit Inquiry and Patronage, with guarantee that present standard of Workmanship, and quality of Machinery shall be maintained. A large quantity of New and Second-Hand TOOLS, ALL SIZES AND SIZES, For Sale at Low Prices. Send for list of second-hand tools. Store at 98 Liberty St., New York, will be discontinued from Feb. 1, 1876, and all sales made from manufactory.

Respectfully,
DAVID W. POND,
Successor to LUCIUS W. POND.

DISCOUNT LISTS.

Hinges {Stanley Works' list... 10¢ to 50¢ each, 75¢ and Butts, {Union Mfg. Co.'s... 10¢ to 60¢ " 75¢. Screw, Bolt, Flat, Hinge and Butt List.—Contains all the lists and discounts that are used. Price, \$1.00
Dayton & Lamerson, 97 Chambers St., N. Y.

VENTILATING & STEAM HEATING.

A thoroughly competent engineer, with extensive experience in the above line, desires employment.

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desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/4; every additional line, 10d. Price, 6d. per Copy, or 50¢ per annum, inclusive of postage to the United States.

CONSUMES THE BLACK SMOKE.

Saves Coal, Saves Waste of Iron, and Consequently Saves Money.

Gilmore's Improved Double Grate Reverberatory Furnace

For Puddling, Boiling, Busselling or Reheating Iron. Its thorough efficiency apparent on examination, and two years' practical test proves it will do all that is claimed for it. Adds but little to first cost, or may be applied to old furnaces, and any furnace can work it without special instruction.

No prudent forge or mill management can afford to be without it.

Royalty, \$100 for each furnace per annum, or one-tenth of actual savings, as may be preferred by the user. Address

H. H. GILMORE, Patentee,
Supt. Boston Rolling Mills,
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WANTED.—A first-class business man familiar with machinery and manufacturing, capable of handling large bodies of men, desires a responsible position. References satisfactory. Address,

IRON AND STEEL,

Care of P. O. Box 813, Bridgeport, Conn.

American Manufactures in England.

A merchant of long experience in Birmingham England, will devote time to the sale of, and to the procuring of orders in the English market for American manufactures. For particulars apply to the Office of The Iron Age, 10 Warren St., N. Y.

SPECIAL NOTICE

A new style of **MEN'S SINGLE GUNS,** in addition to the former line of A. Simon's, Liege, now offered.

SILESIAN SHEET ZINC, Imported by

LOUIS WINDMULLER & ROELKER,
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A SPECIAL MACHINIST AND EXPERT DESIRES a position to reorganize any manufacturing business, or to start new. Can do small drilling or tapping for 10 cents per M; use steam-power for bench molding, and reduce labor costs generally; is thoroughly acquainted with every detail of machinery and hardware business in their most advanced forms. Can furnish information of new machines for which there is a present demand, also, new designs, or can assist anyone unreasonably taxed by patents. For reference, &c., address

E. GODDARD,
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Corner South & Penn Streets, Phila.,
Dealers in

Scrap Iron & Metals, Machinery, Tools, Shafting & Pulleys, Steam Engines, Pumps & Boilers, Copper, Brass, Tin, Rabbit Metals, Foundry

Facings. Best Quality Ingot Brass. Cash paid for all kinds of Metals and Tools.

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The best in the market for ASHES, WASTE, OR GARBAGE. Prices reduced. Large discount to dealers. Address,

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Solid and Homogeneous. Guaranteed tensile strength, 25 tons to square inch. An invaluable substitute for expensive forgings, or for Cast Iron requiring great strength. Send for circular and price list to
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A nice, clean stock of Builders' Hardware, Stoves and House Furnishing Goods, connected with a good tin-shop in a growing city of 8000 inhabitants. Satisfactory reasons for selling. Address **F.,**
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The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of
Iron and Steel Drop Forgings
in quantities to order at reasonable rates.

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101 & 103 Duane St., N. Y.

Ramsey's Car Truck Shifting Apparatus.

The advantages gained by using Ramsey's Car Truck Shifting Apparatus, are as follows:
1st.—The power required to run a car on the level track is sufficient to separate the trucks from a car body.

2d.—It avoids twisting or straining the car frames.
3d.—The manufacturing cost of this Shifting Apparatus will not exceed one hundred dollars. And each one is capable of doing more work with less strain to the car, and without the assistance of an extra Steam Engine, than a Steam Hoist, costing twelve thousand dollars.

At each one of the principal stations where car wheels are regularly changed to new, they stand the strain of a switch is placed, having a depression or pit about eighteen inches deep, with gentle inclines at each end, and on each side a narrow track, remaining on the level, upon which is small but strong trucks, designed to carry supporting beams or cross-bars extending from one to the other across the pit, for the purpose of bearing the car body, while the trucks run down the incline rails to the pit.

A Working Model of this Apparatus is on exhibition at

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Communications may be addressed to

RAMSEY & SCARLETT, as above, to
Box 162, Cobourg, Ontario, Canada.

See The Iron Age of Sept. 7, 1876.

Briesen's Patent Agency

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Second-Hand & New Machine Tools.

Three 21 inch swing "Pond" Drills. Three 4 Spindle Drills. One 5 ft. Radial Drill. One 2 Spindle Profiling Machine. Three Common Milling Machines. One No. 3 Smith & Garvin Milling Machine. One No. 4 Smith & Garvin Milling Machine. One Brown & Sharpe Universal Milling Machine. One Mason Milling Machine. One Crank Planer. One 3000 lb. Ferris & Miles Steam Hammer. Two 32 in. swing 15 ft. bed Lathes. One 20 in. swing 10 ft. bed Lathe. Four 20 in. swing 8 ft. bed Lathes. One 24x36 ft. Planer. One 21 in. swing 8 ft. bed Lathe. One 15 in. swing 6 ft. bed Lathe.

The above tools have been little used, will be sold very low and can be seen at the office of

GEORGE PLACE,
131 Chambers and 103 Reade Sts., N. Y.

Wanted—A Partner,

In a foundry and machine business, already well established. Locality splendid and healthy.

A practical man with means is wanted to join a practical man who is already well established.

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SPECIAL NOTICE.

I have three patents for Dies, Machinery and Tools for making Augers and Bits, each running seventeen years; dated as follows: Dec. 19, 1865; January 31, 1866, and July 3, 1866. There is a special claim on each of the dies. All persons infringing on said patents will be held responsible to the extent of the law. **Russell Jennings,**
Deer River, Conn., Sept. 7, 1874.

Wanted, Light T. Rail.

Parties having for sale 50 to 100 tons of slightly worn, 25 to 35 lbs. T. Rail, can find a purchaser at a reasonable price, by addressing (with price delivered in New York or Philadelphia.)

D. G. AMBLER, Utica, N. Y.

W. & A. C. SEMPLE,

(Manufacturers' Agents.)

RAILWAY SUPPLIES, METALS, &c.

44 Third St., LOUISVILLE, KY.

Trade Report.

Office of THE IRON AGE.
WEDNESDAY EVENING, JAN. 17, 1877.

The financial markets have been undisturbed by any extraordinary influences during the past week, and transactions have been on a restricted scale. The money market has been easier, with a decline to 5 @ 6 per cent. for call loans, closing easy at the inside figure. The discount rate has also been somewhat easier, prime mercantile paper being negotiable at 5 @ 6 per cent., without any free offerings of good names.

Gold has recovered somewhat from its steadily downward course, and an advance has been established, as high as 107 being reached on Tuesday. There was another decline from that point, however, and the ruling rate on Wednesday was 106 1/2 @ 106 3/4, closing at 106 1/2. The following table shows the daily range of the premium:

	Highest.	Lowest.
Thursday.....	106 1/2	106 1/4
Friday.....	106 1/2	106 1/4
Saturday.....	106 1/2	106 1/4
Sunday.....	106 1/2	106 1/4
Tuesday.....	106 1/2	106 1/4
Wednesday.....	106 1/2	106 1/4

There has been a more active call for governments, with heavy investment purchases. One California institution took \$2,000,000 in a single amount. The market has been strong in consequence, and higher quotations have been established. State bonds have been quiet but remain steady, while railroad bonds are strong under moderate transactions. In the stock market the chief features have been a decline in railroad and coal stocks and an advance in telegraphs.

The principal dealings have been in Western Union, Lake Shore, Michigan Central, Delaware, Lackawanna and Western, and St. Paul. The Pennsylvania and Baltimore and Ohio roads advanced their Eastward bound freight rates 5 cents per 100 on Monday, but the Erie, Central and Lake Shore held out at the old rate, though on Wednesday it was announced that the Erie managers would make the advanced rate on freight received from the Western roads which had adopted the new tariff. This leaves the Central and Lake Shore again alone in the contest with the Southern lines. We give below the closing quotations of active shares.

The following is a comparison of the bank averages for the past two weeks:

	Jan. 6.	Jan. 13.	Difference.
Loans.....	\$254,800,100	\$254,173,400	Inc. \$626,700
Specie.....	33,370,800	39,737,400	Inc. 1,366,600
Legal tenders.....	35,283,800	37,042,900	Inc. 1,759,100
Deposits.....	220,783,000	223,868,300	Inc. 3,085,300
Circulation.....	15,508,400	15,517,300	Inc. 8,900

The foreign trade movements for the week are shown as follows:

For the week ended Jan. 13:

	1875.	1876.	1877.
Total for week.....	\$7,904,672	\$8,889,000	\$6,985,322
Prev. reported.....	5,808,864	7,328,539	5,425,709

Since Jan. 1., \$13,008,536 \$16,417,539 \$12,945,081

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Braze goods.....	34	\$3,095
Bronzes.....	4	357
Chains and Anchors.....	58	1,915
Cutlery.....	37	10,439
Guns.....	50	5,808
Hardware.....	5	1,770
Iron, pig, tons.....	100	1,521
Iron, sheet, tons.....	61	2,588
Iron, other, tons.....	350	498
Iron, other, tons.....	890	8,200
Metal goods.....	149	14,400
Nails.....	4	237
Needles.....	15	7,209
Nickel.....	1	146
Old metal.....	4,703	4,413
Per caps.....	23	4,413
Saddlery.....	1	136
Steel.....	503	9,689
Silverware.....	5	8,813
Tin, boxes.....	116	88,813
Tin, 6,968 slabs.....	294,857	97,074
Wire.....	14	2,309
Zinc.....	22,422	1,355

EXPORTS EXCLUSIVE OF SPECIE.

For the week ended Jan. 13:

	1875.	1876.	1877.
For the week.....	\$4,659,275	\$5,060,091	\$6,497,867
Previously reported.....	8,473,655	9,181,724	10,940,449

Since Jan. 1., \$13,133,930 \$14,241,815 \$17,438,316

EXPORTS OF SPECIE.

For the week ended Jan. 13:

	1875.	1876.	1877.
Total for the week.....	\$181,770	\$181,770	\$181,770
Previously reported.....	204,684	204,684	204,684

Total since Jan. 1, 1877..... \$450,404

Same time in 1876..... 1,054,022

Same time in 1875..... 3,944,130

Same time in 1874..... 1,029,973

Same time in 1873..... 3,028,388

Same time in 1872..... 574,887

Government bonds at the close were strong and quoted as follows:

	Bid.	Asked.
U. S. Currency 6s.....	122 1/2	123
U. S. 6s 1881, reg.....	114 1/2	115 1/2
U. S. 6s 1881, con.....	114 1/2	115 1/2
U. S. 6s 1885, reg.....	109 1/2	110 1/2
U. S. 6s 1885, con.....	109 1/2	110 1/2
U. S. 6s 1891, reg.....	110 1/2	111 1/2
U. S. 6s 1891, con.....	110 1/2	111 1/2
U. S. 10-40 reg.....	113 1/2	114 1/2
U. S. 10-40 con.....	113 1/2	114 1/2
U. S. 5s 1881, reg.....	111 1/2	112 1/2
U. S. 5s 1881, con.....	111 1/2	112 1/2
U. S. 4 1/2s 1891, reg.....	108 1/2	109 1/2

The following were the closing quotations of active shares:

	Bid.	Asked.
Atlantic and Pacific Telegraph.....	16 1/2	16 3/4
Chicago & North Western.....	36 1/2	36 3/4
Chicago & St. Paul.....	56	56 1/2
Chicago, Rock Island and Pacific.....	100 1/2	101 1/2
Col. & Ind. Cent.....	9 1/2	9 3/4
Cleveland and Pittsburgh.....	90 1/2	91 1/2
Chicago & Alton.....	99	100
Preferred.....	109	110
Canton.....	25	26
Del. Lack. and Western.....	75	76
Delaware & Hudson Canal.....	70 1/2	71 1/2
Adams Express.....	102 1/2	103 1/2
American Express.....	55 1/2	56 1/2
United States Express.....	56 1/2	57 1/2
Wells, Fargo & Co. Express.....	94 1/2	95 1/2
Erie.....	94 1/2	95 1/2
Harlem.....	138 1/2	139 1/2
Hannibal & St. Joseph.....	124 1/2	125 1/2
Illinois Central.....	59	60
Kansas Pacific.....	2 1/2	2 3/4
Lake Shore.....	54 1/2	55 1/2
Michigan Central.....	48 1/2	49 1/2
Morris & Essex.....	92	93

Milwaukee & St. Paul.....	18 1/2	18 3/4
Prof.....	49 1/2	49 3/4
Mariposa.....	6 1/2	6 3/4
Prof.....	5 1/2	5 3/4
New York Central.....	102 1/2	103 1/2
New Jersey Central.....	34 1/2	35 1/2
Ohio & Mississippi.....	6 1/2	6 3/4
Pacific Mail.....	34	35
Panama.....	12 1/2	12 3/4
Pacific of Missouri.....	17 1/2	17 3/4
Quicksilver.....	14 1/2	14 3/4
Prof.....	30	31
St. L., Kan. City Northern.....	4 1/2	4 3/4
Prof.....	24	25
Tol., Wabash & Western.....	4	4 1/2
Union Pacific.....	59	60
Western Union Telegraph.....	75 1/2	76 1/2

GENERAL HARDWARE.

The uncomfortable condition of our streets, and the varieties of weather that we have enjoyed during the week, added to presidential uncertainties, and the natural dullness incident to the first month of the year, tend to produce about as dull a condition of affairs as the business community of New York have ever experienced. The local trade has been unusually light during the week. The changes in lists and discounts which have occurred since our last writing are given below. In the matter of Strap and T Hinges no satisfactory arrangement has been concluded by the makers, and these goods are offered at prices which it is believed are under the cost of production. For sometime past we have quoted Strap and T Hinges at discount 70 per cent., but as any printed price would be but nominal in the present condition of the market we omit the quotation altogether.

The demand for Nails is very light, but makers look for a speedy improvement in this branch of trade as soon as better weather renders transportation a less serious matter than it is at present. At the meeting of the Nail Manufacturers' Association of the Atlantic States, mentioned by us last week, no change in price or terms was made. We quote, as before, 10d. to 60d., \$3 per keg, net, with the usual allowance of 10 cents per keg for orders of 100 kegs and over, taken in 30 days.

In Foreign Hardware little has transpired. Alfred Field & Co., No. 98 Chambers street, issued, under date of 12th instant, a descriptive list of a number of patterns of Wostenholm's Pocket Knives and Razors, and Wade & Butcher's Razors, which they have decided to discontinue from their assortments of these brands. They offer them at prices very much under market rates. The quantities of each pattern are given in the circular, which also contains the following notice:

We have entirely revised our stock list of Cutlery, and will at all times endeavor to keep a complete line of leading and most desirable patterns of our own Pocket Cutlery, consisting of Fraser, Continental and Field brands. Also, Wostenholm's Pocket Cutlery and Razors, and Wade & Butcher's Razors, which we are prepared to offer to jobbers and wholesale dealers at lowest market rates.

The Meriden Cutlery Company inform us that they have withdrawn their quotation of discounts on Table Cutlery, and their printed list is now void, except as a descriptive one. Their prices are net, to correspond with the other manufacturers in the combination.

In consequence of the unsettled condition of the screw market, and the special discounts quoted by some manufacturers and their agents, the Russell & Erwin Mfg. Co. have issued the following letter circular:

Office of RUSSELL & ERWIN MFG. CO.,
45 and 47 Chambers Street,
New York, N. Y., 1877.

DEAR SIR: Replying to yours asking quotations on Screws, we take pleasure in saying that for the present our regular terms on Flat Head Bright Iron Wood Screws are 60 per cent. discount from list, cash 30 days, no prices guaranteed. We will give your house an additional discount of — per cent., and deduct the same from invoice.

Orders for large quantities of any regular size will be specially considered. Discounts subject to change without notice.

We shall be glad to receive your orders, which shall have our best attention. We invite the closest inspection of our Screws and the severest tests of quality in comparison with any other Screws manufactured.

Respectfully yours,
RUSSELL & ERWIN MFG. CO.
M. J. WOODRUFF, Assistant Treasurer.

Nathan Weed, No. 4 Gold street, has issued a circular informing the trade that he has again established himself in the Hardware commission business. He solicits orders for the D. R. Barton Tool Co., of Rochester, N. Y., for whom he is agent.

Swan & Brombacher, Nos. 33 and 34 Fulton street, desire to caution the trade against some person, unknown to them, who has lately procured goods in their name from several houses. They inform us that it is their invariable rule to send their orders for goods on a printed form.

The Hart, Bliven & Mead Manufacturing Co. have issued a number of pages illustrating new goods, to be pasted in their 1873 catalogue. We notice some handsome patterns of Bronze Metal and figured Enamelled Oblong Store Door Handles, Sash Fasteners, Drawer Pulls, Bell Cranks, &c., &c. They will, in addition, issue in a day or so an illustrated catalogue of Stationers' Hardware, containing a great many new and elegant designs of Ink Stands, Pen Racks, Paper Files, Check Cancellers, Paper Clips, Letter Weights, Match Safes, &c.

We invite the attention of the trade to the advertisement of the St. Louis Stamping Co., of St. Louis, Mo., manufacturers of Granite Iron Ware, which will be found on page 16. We expected to be able to present their price list for these goods in this issue, but, although we are informed that it was forwarded, up to the hour of going to press it has not reached our office.

The Rule Manufacturers' Association, at a meeting held in Hartford 13th inst., fixed the discount on Boxwood Rules at 55 and 10 per cent., and on Ivory Rules and miscellaneous articles at 45 and 10 per cent.

We have already announced the change that has been made in the firm of Charles Parker, of Meriden, Conn., which is hereafter to be known as the Charles Parker Company, incor-

porated under the laws of the State of Connecticut. The officers of the company are: Charles Parker, president; Charles E. Parker, vice-president, and Dexter W. Parker, secretary and treasurer. Their business will continue the same as heretofore, including the manufacture of first-class sporting guns, which has, we are informed, increased to a greater extent than any other similar concern in the United States. The business of this company was established nearly fifty years ago, and has been successfully carried up to the recent change, by the personal energy of Mr. Parker, and is, we believe, the largest and most successful manufacturing concern of its kind that has ever been owned and conducted by a single individual in the United States.

Parmenter & Walker and the Western School Supply Co., manufacturers of Carpenter's Chalk and Chalk Crayons, have entered into a combination and advanced the price of their goods. In a circular issued under date of 4th instant, they say: "After selling our goods for several months at rates tending to the ruin of our business, and the continual annoyance of dealers from unsettled prices, we have now so far united and combined our manufacturing interests as to give steadiness and firmness to market values, and at the same time to furnish Crayons and Chalk at exceedingly low rates to the trade."

P. & F. Corbin have on exhibition at their warerooms, No. 87 Chambers St., a solid bronze metal fancy Table, enamelled and gilt, similar to the one recently exhibited by them at the Centennial Exhibition, and which attracted so much attention. It is a pillar Table, richly ornamented, with gilt chains, and is by far the finest piece of workmanship of its kind that has ever come under our notice.

We cheerfully commend the attention of parties requiring the services of a resident buyer in this city to the advertisement signed G. U. S., which appears among our Special Notices on the opposite page. The advertiser is known to us for many years, and is a gentleman of high standing in the business community.

Reynolds & Co., New Haven, Conn., have issued, under date of 20th instant, a circular containing their revised list for Machine Screws and Machine Screw Taps. Their list is the same as the American Screw Co.'s list of January 1, which was published in our issue of 4th instant. They quote Oval Head Machine Screws, net list; Flat Head do., discount 10 per cent.; and Machine Screw Taps, discount 33 1/2 per cent.

In their advertisement this week the Russell & Erwin Mfg. Co. illustrate a new Latch which they are manufacturing, styled the "Anti-friction." This Latch accomplishes the same results as is aimed at in the "Easy Spring Locks," recently introduced, but in an entirely different way, and without lessening the strength of the spring by which the Latch is actuated. The mechanism by which this is accomplished is so simple that it cannot possibly get out of order, and its operation is so perfect that it is difficult when closing a door even to feel the contact of the Latch against the strike. The list price of the Mortise Lock and Latch, with handle for store doors, is with single handle per set, \$6.25, and with double handle, \$8, subject to their usual trade discount for Bronze goods. These goods are also made with rabbeted fronts at \$7 and \$8.75 per set for single and double handle respectively.

The Lalance & Grosjean Mfg. Co. have issued to-day the following revised list for their Marbled Iron Ware, the regular discount from which is 25 per cent. They also issue a revised price list for patent Threaded Tinned Spoons and Forks, which is embodied in the revised list for these goods, which will be found herewith. They say in a note accompanying their new prices: "Please cut out of our price list of Nov. 15th, 1876, the following pages, viz., 21, 25, 26, 27, 28, 29, 30 and 31, leaving a stub to paste in the corrected pages accompanying this notice."

MARBLIZED IRON WARE.

Strong Lipped Saucepans.

No.....	9	10	12	14
Quarts.....	4 1/2	5 1/2	6 1/2	7 1/2
Inches.....	4 1/2	5 1/2	6 1/2	7 1/2
Marbled, per doz.....	\$3.00	3.25	3.50	4.00
Tin Covers.....	35	37	40	45

No.....	16	18	20	22
Quarts.....	2 1/2	3 1/2	4 1/2	5 1/2
Inches.....	2 1/2	3 1/2	4 1/2	5 1/2
Marbled, per doz.....	\$5.50	6.00	6.50	7.00
Tin Covers.....	75	80	85	90

No.....	24	26	28	30
Quarts.....	5 1/2	6 1/2	7 1/2	8 1/2
Inches.....	5 1/2	6 1/2	7 1/2	8 1/2
Marbled, per doz.....	\$9.40	10.00	10.50	11.00
Tin Covers.....	150	155	160	165

No.....	10	12	14	16
Quarts.....	2 1/2	3 1/2	4 1/2	5 1/2
Inches.....	2 1/2	3 1/2	4 1/2	5 1/2
Marbled, per doz.....	\$5.50	6.00	6.50	7.00
Tin Covers.....	75	80	85	90

No.....	18	20	22	24
Quarts.....	3 1/2	4 1/2	5 1/2	6 1/2
Inches.....	3 1/2	4 1/2	5 1/2	6 1/2
Marbled, per doz.....	\$7.50	8.00	8.50	9.00
Tin Covers.....	90	95	100	105

No.....	24	26	28	30
Quarts.....	5 1/2	6 1/2	7 1/2	8 1/2
Inches.....	5 1/2	6 1/2	7 1/2	8 1/2
Marbled, per doz.....	\$14.00	15.00	16.00	17.00
Tin Covers.....	150	155	160	165

No.....	30	32	34	36
Quarts.....	6 1/2	7 1/2	8 1/2	9 1/2
Inches.....	6 1/2	7 1/2	8 1/2	9 1/2
Marbled, per doz.....	\$19.00	20.00	21.00	22.00
Tin Covers.....	200	205	210	215

No.....	101	104	108	112
Quarts.....	1 1/2	2 1/2	3 1/2	4 1/2
Inches.....	1 1/2	2 1/2	3 1/2	4 1/2
Marbled, per doz.....	\$8.90	11.50	14.00	16.00

Covered Seamless Convex Cooking Pots.

No.....	104	106	108	110
Quarts.....	4 1/2	5 1/2	6 1/2	7 1/2
Inches.....	4 1/2	5 1/2	6 1/2	7 1/2
Marbled, per doz.....	\$16.50	18.00	19.50	21.00

Milk or Rice Boilers.

No.....	14	16	18	20
Quarts.....	1 1/2	2 1/2	3 1/2	4 1/2
Inches.....	1 1/2	2 1/2	3 1/2	4 1/2
Marbled, per doz.....	\$15.00	16.00	17.00	18.00

Flat Bottom Tea Kettles.

No.....	6	7	8	9
Quarts.....	1 1/2	2 1/2	3 1/2	4 1/2
Inches.....	1 1/2	2 1/2	3 1/2	4 1/2
Marbled, per doz.....	\$18.00	20.00	22.00	24.00

Deep Preserving Kettles.

No.....	16	18	20	22
Quarts.....	2 1/2	3 1/2	4 1/2	5 1/2
Inches.....	2 1/2	3 1/2	4 1/2	5 1/2
Marbled, per doz.....	\$7.00	8.00	9.00	10.00

Lipped Preserving Kettles.

No.....	160	180	200	220
Quarts.....	2 1/2	3 1/2	4 1/2	5 1/2
Inches.....	2 1/2	3 1/2	4 1/2	5 1/2
Marbled, per doz.....	\$12.00	13.00	14.00	15.00

Extra Deep Fruit Kettles.—Brass Pattern.

No.....	4	5	6	7
Quarts.....	1 1/2	2 1/2	3 1/2	4 1/2
Inches.....	1 1/2	2 1/2	3 1/2	4 1/2
Marbled, per doz.....	\$16.00	18.00	20.00	22.00

Milk Pails.

No.....	1	2
Inches.....	7x3½	10½x5½
Marbleized, per doz....	\$10.00	15.00

Patent Threaded Table Spoons.			
No.	116 or 40 217 or 41 240 or 42	251 or 62 295 or 62	Riveted
Inches	7 1/4	8 5/8	7 3/4
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Solid Ex. Strong.			
No.	250 or 30 261 or 21	274	8 1/2
Inches	7 1/4	8 5/8	7 3/4
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Patent Threaded Table Forks.			
No.	24, Solid, Tinned, 7 1/4 inches, per gross.	250	8 1/2
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Patent Threaded Basting Spoons.			
Inches	10 1/2	11 1/2	12 1/2
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Riveted Flat or Round Handle or Threaded.			
Inches	10 1/2	11 1/2	12 1/2
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Flat Handled Table Spoons.			
No.	11 or 160 11 1/2 or 170 12 or 180 9 1/2 or 85	12 1/2	4 00
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Forged Basting Spoons.			
Inches	10 1/2	11 1/2	12 1/2
Weight	7.00	7.25	6.00
Per doz.	84.00	87.00	72.00

Superior Silver Steel Spoons.—Oval Thread.—Patent.			
No. 7, Table, 8 1/2 inches, per gross.	113.00		
Case lots 12 gross.	7.50		

Superior Silver Steel Spoons.—Olive.—Patent.			
No. 8, Table, 8 1/2 inches, per gross.	113.50		
Case lots 12 gross.	7.75		

Superior Silver Steel Table Forks.—Oval Thread.—Patent.			
No. 70, 7 1/4 inches, per gross.	115.00		
Case lots 12 gross.	7.50		

Superior Silver Steel Table Forks.—Olive.—Patent.			
No. 80, 7 1/4 inches, per gross.	116.00		
Case lots 12 gross.	7.50		

The Stanley Works, New Britain, Conn., and No. 79 Chambers street, have issued, under date of 1st instant, the following discount sheet, to apply to their price list of October, 1876, and supplements of Feb. 5, 1874, and July 1, 1875. Those goods the prices of which have been changed are indicated by an asterisk:			
(Circular No. 81.)			

Discount per cent.			
Bronzed Capped Butts.	45		
Bronzed Loose Joint Butts with Acorns.	45		

The Staley Works, New Britain, Conn., and No. 79 Chambers street, have issued, under date of 1st instant, the following discount

sheet, to apply to their price list of October, 1870, and supplements of Feb. 5, 1874, and July 1, 1875. Those goods the prices of which have

1, 1916. Those goods the prices of which have been changed are indicated by an asterisk :

(Circular No. 81.)

	Discount per cent.
Bronzed Capped Butts.....	45
Bronzed Loose Joint Butts with Acorns.....	10
Bronzed Loose Joint Butts, no Acorns.....	10

Bronzed Loose Joint Butts, no Acorns.....	15
Bronzed Narrow Butts, &c	30
Bronzed Light Narrow Butts.....	30
Bronzed Light Inside Blind Butts.....	30

*Bronzed Pallament Butts.....	30
Bronzed Barrel Bolts.....	40
Bronzed Flush Bolts.....	20
Bolts, Chain.....	40

Bolts, Cottage, Cast.....	70
Bolts, Wro't Barrel, B. K., New List.....	50, 10&10
Bolts, Wro't Barrel, T. K., New List.....	50, 10&10
Bolts, Wro't Barrel, P. K., New List.....	50, 10&10

Bolts, Light, Wro't Barrel, Brass Knob, New List	50, 10&10
Bolts, Wrought Brass Barrel	35
Bolts, Wro't Brass Barrel, Tinned Bolts	25

Bolts, Canada, Por. and Min. Jap'd.	45	5
Bolts, Canada: Por. and Min. Plated.	50	10
Bolts, Wro't Flat, Steel Spring.	30	10
Bolts, Wro't Flat, Steel Springs.	20	10

Bolts, Wrought Flat, Steel Spring.....	30&10
Bolts, Wro't Flat Tail.....	20
Bolts, Flush, Sunk and Proj.....	15&10
Bolts, B. K. Flush, Common.....	30&10

Bolts, B. K. Flush, Ex. Heavy	20&10
Bolts, Plated K. and Slide Flush	10&10
Bolts, Bronzed K. and Slide Flush	10&10
Bolts, Plated K. and Slide Flush	10&10

Bolts, B. K. Wrought Shutter.....	35
Bolts, Wrought Shutter, "Stanley's".....	50
Bolts, Cased Shutter.....	15
Bolts, Shutter, T. K. Lock.....	15 & 10

Bolts, Shutter, Tinned Knob	30
Bolts, Wro't Shutter, Galvanized.....	40&5
Bolts, Southern Door.....	20
Bolts, Wro't So're Sp'ng, New List	50 10&10

Bolts, Wro't Store Door, New List.....	50, 10& 0
Bolts, Wro't Store Door, New List.....	50, 10& 10
Bolts, Wro't Square and Round Neck.....	35
Bolts, Wro't Tower.....	20

Bolts, Wrought Brass Barrel, Tinned Butts.	45
Butts, Light Inside Blind, Jap'd.	30
Butts, Light Narrow, Jap'd.	30
Butts, Smooth Bright Iron as follows:	
Butts, Smooth Bright Iron as follows:	

Butts, Light Narrow, Loose J't, List of Narrow...	5
Butts, 2x2 and 2x2½, L'se Pin, List of L'se J't.	30&5
Butts, 2x2 and 2x2½, L'se J't, List of L'se J't.	30&5
Butts, L't Narrow, Smooth Bright Iron.....	30&5

Butts, Narrow.....	40&5
Butts, Back Flaps.....	35&5
Butts, Inside Blind.....	35&5
Butts, Table ..	25&5

Butts, Chest.....	40&5
Butts, Pew Door.....	40&5
Butts, Broad.....	40&5
Butts, Reversible List of Loose Joint.....	40&5

Butts, Loose Joint.....	40&5
Butts, Light Inside Blind, Smooth Bright Iron.....	40&5
Butts, Reversible, Japanned.....	12½
Butts, Cas. with Accoups.....	10

*Butts, Cast, with Acorns.....	40
*Butts, with Acorns and Fric. Roller....	
*Butts, Loose Joint, with Japanned, Bronzed or Silvered Acorns.....	45, 12½
*Butts, Loose Joints, ditto.....	6

• Butts, Loose Joints, ditto	10
• Butts, Jap'd, Loose J't, without Acorns.	10
• Butts, Loose Pin, with Silv'd, Acorns...	10
• Butts, Parhamment	20 & 10

Corner Irons.....	50
Hammers, Carpet	20
Handles, Flush Chest and Drawer.....	40&10
Handles, Wro't Chest, "Stanley Works".....	add 15

Handles, Wrot Chest, "Austin Beebe".....	add 10
Handles, Lifting and Commu.	50
Hasps and Staples, Wrought.....	40
Hasps, Hooks and Staples, Wrought.....	40

Staples, Wrought, Hand forged.....	40
Hinges, Heavy and Extra Heavy T, "Hart's	Appl
Patent"	
Hinges, Steel and T. New List	

Hinges, Strap and T, New Line.....																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Hinges, Bulk Butter and FINE.	net
Hinges, Norwich Blind.	net
Hinges, Plated and Raised Blind.	net
Hinges, Rolled Plate and Raised.	5

Spanned Screws, American Screw Co.'s List of	
Dec. 1, 1875.....	30
Staples, Floor, Bolt and Lock.....	45
Steamboat Shutter Fast.....	net

Step Ladder Joints.....net
Washers, w ro't Iron. Our List (see Supplement).
Discount, 8c. per pound.
For changes in list of Wrought Japanned Butts

with Acorns, Wrought Barrel and Wrought Square Bolts, Light Narrow Butts and Strap and T Hinges, see Supplements. In comparing prices of Wrought Shutter Bolts, Hasps and Staples and Washers, see

Terms—Net cash, 30 days. Payable in New York current funds. Freight as heretofore. Prices subject to changes of the market without notice.

The Girard Wrench Mfg. Co., Girard, Pa., have issued the following circular and price

list under date of 1st inst., to which is added a number of flattering testimonials from manufacturers and dealers in this country and Eng-

facturers and dealers in this country and England who have tested them. The regular discount to the trade from this list is 50 per cent.

An illustration of the Girard Wrench will be found in their advertisement on page 34 :

Genève, B. Jan. 1. 1877

The Girard Wrench is presented to the trade with full confidence that it is equal in all respects to any Wrench heretofore manufactured.

It has been fully tested by experts and the best mechanics, and pronounced by them an A No. 1 first-class article, made from the best materi-

is, comprising all the qualifications necessary to combine strength, durability, and perform its work with ease and satisfaction.

Having fully examined and tested all varieties
and brands of Screw Wrenches, we have en-

Bolts, Wrought Brass Barrel, Tinned Butts.			
Bolts, Wrought Brass Barrel, Tinned Butts.	45		
Bolts, Wrought Brass Barrel, Tinned Butts.	45		

Bolts, Wrought Brass Barrel, Tinned Butts.			
Bolts, Wrought Brass Barrel, Tinned Butts.	45		
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Bolts, Wrought Brass Barrel, Tinned Butts.			
Bolts, Wrought Brass Barrel, Tinned Butts.	45		
Bolts, Wrought Brass Barrel, Tinned Butts.	45		

deavored to avoid all their weak points and imperfections, and combine their good qualities in producing an article that would be an improvement upon any brand yet offered.

We fully guarantee our goods in every respect. The Girard Wrench is fully warranted. A label is attached to the handle of each one, warranting the bar, head and screw made from the best wrought iron. With new and improved machinery and the most extensive works in the world, our capacity for supplying the demand will be almost unlimited. Our motto will be: "Make good goods and sell them cheap," trusting in that way to build up a trade second to none.

Polished—Hardware. Black—Hardware.

8 inch. \$12.00 8 inch. \$10.00

10 inch. \$14.00 10 inch. \$12.00

12 inch. \$16.00 12 inch. \$14.00

14 inch. \$18.00 14 inch. \$16.00

16 inch. \$20.00 16 inch. \$18.00

18 inch. \$22.00 18 inch. \$20.00

20 inch. \$24.00 20 inch. \$22.00

22 inch. \$26.00 22 inch. \$24.00

24 inch. \$28.00 24 inch. \$26.00

26 inch. \$30.00 26 inch. \$28.00

28 inch. \$32.00 28 inch. \$30.00

30 inch. \$34.00 30 inch. \$32.00

32 inch. \$36.00 32 inch. \$34.00

34 inch. \$38.00 34 inch. \$36.00

36 inch. \$40.00 36 inch. \$38.00

38 inch. \$42.00 38 inch. \$40.00

40 inch. \$44.00 40 inch. \$42.00

42 inch. \$46.00 42 inch. \$44.00

44 inch. \$48.00 44 inch. \$46.00

46 inch. \$50.00 46 inch. \$48.00

48 inch. \$52.00 48 inch. \$50.00

50 inch. \$54.00 50 inch. \$52.00

52 inch. \$56.00 52 inch. \$54.00

54 inch. \$58.00 54 inch. \$56.00

56 inch. \$60.00 56 inch. \$58.00

58 inch. \$62.00 58 inch. \$60.00

60 inch. \$64.00 60 inch. \$62.00

62 inch. \$66.00 62 inch. \$64.00

64 inch. \$68.00 64 inch. \$66.00

66 inch. \$70.00 66 inch. \$68.00

68 inch. \$72.00 68 inch. \$70.00

70 inch. \$74.00 70 inch. \$72.00

72 inch. \$76.00 72 inch. \$74.00

74 inch. \$78.00 74 inch. \$76.00

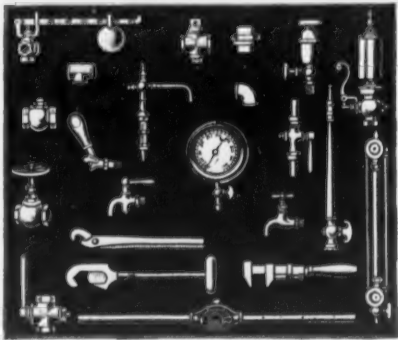
76 inch. \$80.00 76 inch. \$78.00

78 inch. \$82.00 78 inch. \$80.00

80 inch. \$84.00 80 inch. \$82.00

82 inch. \$86.0

Paris, Dec. 31, 1876.—*Metallo*.—This being about the close of the year, the demand in the European metal markets have been but limited in extent. *Copper*.—The deliveries to consumption during the latter part of the present month have been unusually light, while the arrivals have been ample. The market has been here for some time quiet, and a heavy amount of stock, so that we shall have to rely on a very steady demand in order to prevent trading values for the next month or two. *Business* has been a little better here, the prices are upheld with extreme difficulty. We quote: *Chili* 200 francs; *Common ditto*, 197-50; *Ingoits*, 205; *Best Selected*, 207-50; and *Pure Corocoro Ore*, 300. At *Havre*, first brands *Chili Bars* have from 200 given to 205 francs; *Chili Bars* of second and third brands have declined to 195 to 196-25 francs; *Cuivre*, the two France lower on this sort; *Lota* and *Urmeneta* are quoted at 198-75. *Copper* is again weaker at *Marseilles*, and the slight advance of a fortnight since has been entirely nullified. *Lead*.—The fish in stocks, 190; *Red Tokai*, 195; *small Refined Ingoits*, 197-50; *Shavang*, 240; *Bolts*, 245; and *Yellow Metal Sheathing*, 210. *Tin*.—The statistics for the present month to be published in England and on the Continent are not very encouraging, and on the encouraging nature to holders, but these expectations have been somewhat discounted through the gradual decline we have been stating. *Strait* prices are various, and at *Havre* or *Paris*, 207-60; *Bullion*, *Strait* and *Australian*, 202-50; and *English*, 200. *Tin* is well held at *Marseilles*, and some sales of *Strait* have been effected at 57-50 francs. *Aluminum* is quiet, and at *Havre* or *Paris*, 57-50 francs. *Iron* is quiet, but the smelted works, in consequence of low stocks on hand, seem little inclined to make concessions on prices asked, which are the following: *English*, 57-50 francs; *Silesian*, 57-50 francs; *Belgian*, 57-50 francs; *Sheet and Pipe*, 59; and *shot*, 57. *Spelter* has continued in its downward course in England, and, of course, has influenced unfavorably the Continental markets. There has been a decline here, and at *Havre*, *Spelter* has declined to 56-50 francs, and other good brands, 57; ditto at *Paris*, 57-50 francs. *Spelter* is worth 56-75 to 57, against 58-50. It commanded a week ago, there

EATON, COLE & BURNHAM CO.,58 John Street, New York.
MANUFACTURERS OFWrought Iron
PIPE,
Cast Iron
FLANGED PIPE,
Cast Iron
RADIATORS
and BOILERS.Brass & Iron
STEAM
Gas & Water
FITTINGS.
PLUMBERS'
MATERIALS.STEAM GAUGES, TOOLS,
and all Supplies used by Machinists, &c.**Pyrolusite Manganese Co.,**

MINERS, DEALERS AND EXPORTERS OF HIGHEST

**Crystallized Black and Gray Oxides of
MANGANESE.**Ground, granulated and especially prepared to suit all branches of the home trade.
Warranted to contain from 70 to 90 per cent. peroxide of manganese, and to give satisfaction with regard to price and quality.

ALSO, MANUFACTURERS OF SUPERFINE FLOATED

Standard Barytes.

Office, 214 Pearl Street, New York

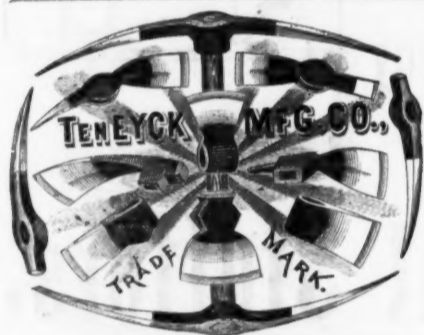
A. L. DUNTON & CO.

213 N. 4th STREET, PHILADELPHIA, PA.

HAVE FOR SALE THE FOLLOWING

NEW ENGINES, BOILERS, STEAM PUMPS, &c.

One 6 H. P. Agricultural Engine, \$535; one 5 H. P. Portable Engine, \$350; one 8 1/2 x 16 Horizontal Engine, Pump and Heater, \$575; one No. 1 Sturtevant Exhaust Fan, \$35; one 4x6 Vertical Engine, \$175; one 3x4 Horizontal Engine, nickel-plated, very handsome, \$75; one 2x4 Horizontal Engine, \$35; one 2x6 Beam Engine, \$75; one 2 1/2 x 5 1/2 Horizontal Engine, \$80. Portable Forges, all sizes; the Selden Steam Pumps; Clark's Blower; Belt Pumps; Governors, Injectors, Oil and Suet Cups, Oil Cans, Vises, Belting, Packing, Hose, &c. Also the following second-hand Machinery: one 50 H. P. Horizontal Tubular Boiler but little used, \$750; one 20 H. P. Vertical Tubular Boiler, \$350; one 8 H. P. Vertical Tubular Boiler, nearly new, \$175; one 4 H. P. Vertical Tubular Boiler, \$95; one 10 H. P. Locomotive Boiler, \$275—this is very good; three Horizontal Engines, 8 1/2 x 16, \$175; 7 x 10, very good, \$200; 6 x 12, \$170; One Platform Scale, 4000 pounds capacity, \$80; one Large Alden Fan, outlet 14x22, \$80; one Grindstone, with Iron Stand, very good, \$20; one No. 2 Worthington Pump, \$90. Lot Wrought Iron Pipe, Grate Bars, &c. Also one 7 1/2 x 10, Washington Iron Works, Portable Engine on skids, very good order, \$475.

**Ten Eyck Axe Mfg. Co**

COHOES, N. Y.

Warehouse, 103 Chambers St., N. Y.

Manufacturers of

AXES

Of all kinds.

Hatchets, Adzes, Grub Hoes, Mattocks and Picks.

Catalogues and Price Lists furnished upon application.

John T. Lewis & Bros.,No. 231 South Front St.,
PHILADELPHIA.TRADE MARK.
MANUFACTURERS OF
PURE WHITE LEAD, RED LEAD,
Litharge, Orange Mineral,
Linseed Oil
AND PAINTERS' COLORS.The Atlantic White Lead and Linseed Oil Company,
MANUFACTURERS OFWhite Lead (Atlantic), Red Lead,
Litharge & Linseed Oil.
ROBERT COLGATE & CO.,
287 Pearl Street, New York.ESTABLISHED A.D. 1777.
WETHERILL & BROTHER,
MANUFACTURERS OF
**WHITE LEAD,
RED LEAD, LITHARGE & ORANGE MINERAL.**
OFFICES, 31st STREET, Below CHESTNUT, PHILADELPHIA.**Brooklyn White Lead Co.**White Lead, Red Lead and
Litharge.
59 Maiden Lane, NEW YORK.
FISHER HOWE, Treas.**JOHN JEWETT & SONS,**

Manufacturers of the well known Brand of

WHITE LEAD.Also Manufacturers of
LINSEED OIL
182 Front Street, NEW YORK.

Pipe, Fittings, &c.

McNab & Harlin Mfg. Co.,

MANUFACTURERS OF

BRASS COCKS AND VALVES

For STEAM, WATER and GAS.

Iron Pipe and Fittings, Plain and Galvanized.

PLUMBERS' MATERIALS.

New Illustrated Catalogue and Price List sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street N. Y.

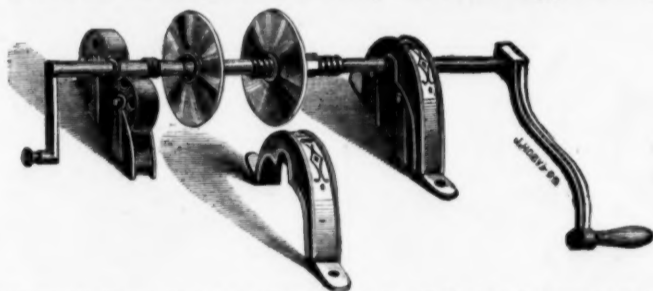
**The Acme Pipe Cutter.**

MADE ENTIRELY OF SOLID CAST STEEL.

Cuts Wrought Iron, Brass and Copper Pipes, Round Iron &c perfectly true without leaving burr on pipe contracting or splitting it. Cuts out a chip similar to a lathe tool. The knife may be removed and ground. Send for descriptive circular to manufacturers.

Pancoast and Maule
PHILADELPHIA PA.**READING BUTT WORKS.**

RICK BROTHERS, Reading, Pa.,

MANUFACTURERS OF DRILLED, CAST BUTTS, AXLE PULLEYS, BRONZED and JAPANNED BRACKETS, GRIND STONE HANGINGS, HAY FORK PULLEYS, HAT and COAT, HARNESS and SCHOOL HOUSE HOOKS, DOOR LATCHES, B. D. HANGERS and RAIL, APPLE PAREHS, WALL SAFES OR CYLINDER RINGS, and BUILDERS' and SHELF HARDWARE GENERALLY.
Particular attention paid to goods for export.

New York Warerooms, 103 Chambers Street. E. E. YATES & CO., Agents.

O. H. HICKS & CO.,

Manufacturers of the

"Lockwood" Steel Hoe

AND

The "Wall Protector" Match Safe,
An Article of Unusual Merit.

Send for sample and prices.

OFFICE & WORKS,

45 N. Holliday St., Baltimore, Md.

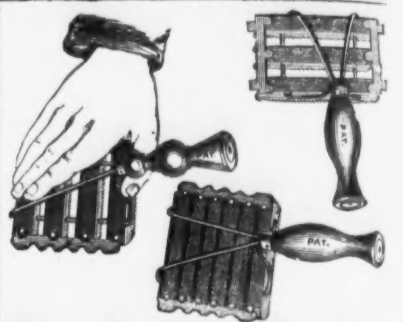
PHILIP S. BIGLIN,

Successor to W. F. SHATTUCK & CO.,

Manufacturers' Agent for

AMERICAN HARDWARE.

95 Reade & 113 Chambers Sts., New York,

Shattuck's Union and Counter Scales.
Phelan's Axes, Hatchets, Picks, &c.
Wellman's Gimlet, Gimlet Bits, &c.
Griswold's Augers, Auger Bits, &c.
"Alroyd & Co." Stocks and Dies.
Yaw's "Genuine" Wrought Cow Bells.
Barlow's Hand and Sleigh Bells.Maltby's Britannia and Cocoa Dippers.
Eddy's Referred Lamp Black.
"Eagle" Axe, Pick and other Handles.
"Eureka" Flint, Sand and Emery Papers.
Corland Forged Horse Sails.
Tackle Blocks, Spokes, &c., &c.**The Perfect Comb.**We call your attention specially to our new patent end-less wire frame comb. The result of a long series of experiments, made with a view to meeting all the requirements of a Perfect Comb. It is better, stronger, and more durable than any ever before invented. The raised-wire shank gives what has never before been attained, viz: a rest and brace for the thumb, in such a position that the hand cannot come in contact with the bones while using the comb. The wire braces which run from the shank over the back to the front teeth give strength and durability in a direction never heretofore attained, and at the same time serve as an extra handle; and when clasped by the fingers in connection with the raised shank the comb is more firmly, easily, and completely held, and with much less fatigue to the hand than is possible in any other formation—in short, it needs but a trial to vindicate its name: **The Perfect Comb.****THE LAWRENCE COMB CO.**

Factory and Office,

382 2d Ave., cor. 22d St., N. Y.

WM. S. CARR & CO.

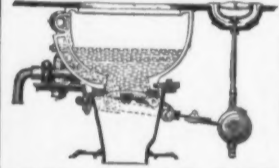
Sole Manufacturers of

CARR'S

PATENT

Water

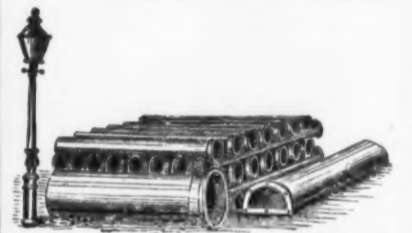
Closets,



PUMPS, CABINET WOOD WORK, &c.

106, 108 & 110 Centre Street,

Factory, Mott Haven, NEW YORK.

**R. D. WOOD & CO.,**

Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

Lamp Posts, Valves, &c.,

Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

**Tackle Blocks**

Of all Description.

SHIP BLOCKS,

Well and Ships'

PUMPS.

Patent Pressed

PUMP LEATHERS.

Dealer in LIGNUMVITÆ WOOD.

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Factory, 36 Burling Slip, S6 South St., N. Y.

The Hubbel Screw Co.,

LIMITED,

Are now prepared to sell, to approved parties, licenses to use the improvements in machinery for making Metal Screws, secured to them by Letters Patent, at the rate of fifteen dollars per month.

They are also prepared to contract for Machine Screws of every description made in solid dies.

Address

JOHN S. LENG, Treasurer,

No. 212 Pearl Street, New York.

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PROPOSALS

Are invited for the construction of

One Hundred Screw Making Machines,
Hubbell's Patent.

Specifications and particulars given on application to

JACOB LORILLARD,

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P. O. Box 3565.

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Glue, Emery, Crocus,**SAND AND EMERY PAPERS,**

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Ostrander W. R. 19 Ann. N. Y.	6
Animal Traps.	
The Sellers Mfg. Co., 501 Market, Philadelphia.	5
Architects, Manufacturers of.	
Fisher & Norris, Trenton, N. J.	25
Ash Sifters.	
Horn Bros., Boston.	3
Angers, Bits, etc., Manufacturers of.	
Clark Wm. A., Westfield, N. Y.	37
Guthrie, Chas. M., Philadelphia.	13
Harlow C. L. & Co., Bridgewater, Mass.	18
The Conn. Valley Mfg. Co., Waterbury, Conn.	12
The Douglas Mfg. Co., 62 Reade, N. Y.	9
Arm Wedges (Iron).	
American Sledge & Carriage Iron Co., Boston, Mass.	27
Bars, Edge Tools, &c., Manufacturers of.	
J. B. Barton Tool Co., Rochester, N. Y.	13
James M. H. & Co., Cohoes, N. Y.	25
Ten Eyck Axle Mfg. Co., Cohoes, N. Y.	26
Ases, Springs, etc., Manufacturers of.	
Clark, Smith & Co., Buffalo, N. Y.	12
Cleveland Axle Mfg. Co., Cleveland, O.	12
Cook R. & Sons, Winted, Ct.	12
Springer Perch Co., Bridgeport, Conn.	12
Hotchkiss Guy C., Field & Co., Brooklyn, E. D.	35
Barn Door Hangers.	
Moore S. H. & E. J., Chicago, Ill.	33
Bed Screws, Makers of.	
Bedford Co., Bridgeport, Conn.	5
Bellows, Manufacturers of.	
Churchyard, Joseph, Buffalo, N. Y.	36
Newcomb Bros., 586 Water, N. Y.	36
Scott Geo. M., Chicago, Ill.	36
Bells (Sleigh).	
Bevin Bros. Mfg. Co., Easthampton, Conn.	33
Bench Stairs.	
Tucker & Dorney, Indianapolis, Ind.	12
Blind Hinges.	
The Hollowbrook Patent Blind Hinge Mfg. Co., Waterbury, N. Y.	6
Belting, Leather, Makers of.	
Alexander Bros., 412 N. 3d, Phila.	35
Armstrong Wm. F., Jr. & Bros., Phila.	35
Belting, Rubber.	
Levickson R. & Co., Philadelphia, Pa.	35
Bird Traps.	
Lindeman O. & Co., 254 Pearl, N. Y.	3
Maxheimer John, 249 Pearl, N. Y.	11
O'Brien Mfg. Co., 79 Bleeker, N. Y.	17
Bit Braces.	
Milner's Falls Mfg. Co., 14 Chambers, N. Y.	25
Black Lead.	
Melville Bros., Philadelphia, Pa.	33
Blacksmiths' Tools.	
Harvey H. H., Augusta, Me.	36
Blowers, Makers of.	
Keystone Portable Forge Co., Philadelphia.	31
Bolt Machines.	
Forsyth S. C. & Co., Phila.	31
Bolts (Screw).	
East Bolt Works, Philadelphia, Pa.	12
Samuel Hall's Son & Co., 230 W. 10th, N. Y.	12
Borax.	
Pine Bros. & Co., New York.	6
Pope Thomas & Bro., 292 Pearl, N. Y.	6
Brass Butts, Makers of.	
Thibout W. J., 230 Pearl, N. Y.	6
Brass, Manufacturers of.	
Anastasi Bros. and Copper Co., 19 Cliff, N. Y.	2
Brass Goods Mfg. Co., 290 Pearl, N. Y.	2
Davol John & Sons, 100 John, N. Y.	2
Holmes, Booth & Havens, 49 Chambers, N. Y.	2
Miller Edw. & Co., 4 Warren, N. Y.	2
Pillar & Atwood Mfg. Co., 80 Chambers, N. Y.	2
Scovill Mfg. Co., 80 Chambers, N. Y.	2
The Wilcox Mfg. Co., 50 Barclay, N. Y. and 96 John, N. Y.	2
Waterbury Bros., 80 Chambers, N. Y.	2
Brick Presses, Makers of.	
Carnell P. L. & E. L., 184 Germantown Ave., Phila.	28
Bridge Builders.	
Moseley Iron Bridge and Roof Co., 5 Day, N. Y.	5
Leachman Bridge and Iron Works, Rochester, N. Y.	25
Brushes (Wheel).	
Greaser P. M., 117 John, N. Y.	27
Butcher and Sheep Knives, Manufacturers of.	
Wilson John, Sheffield, England.	12
Butcher's Knives.	
Forscher Chas. A., 117 John, N. Y.	33
Butts and Hinges.	
American Sash and Butts Co., 82 Beekman, N. Y.	40
Rick Bros., Reading, Pa.	40
Samuel & Birge Mfg. Co., St. Louis, Mo.	40
Union Mfg. Co., 35 Chambers, N. Y.	40
Can Openers.	
Dunlop J. S., 3011 N. Y.	1
Carriage Builders.	
Carriage Builders, Wilson & Hubbard, Phila.	12
Carriage Hardware, Makers of.	
Hayden & Smith, Auburn, N. Y.	13
Smith H. D. & Co., Plantville, N. Y.	13
Carriage Springs.	
Stock John H. & Co., Newark, N. J.	33
Car Wheels, etc., Manufacturers of.	
Taylor Iron Works, High Bridge, N. J.	33
Casting Irons and Cotton Hooks.	
Carver John, 281 Market, N. Y.	4
Chisels, Manufacturers of.	
Rick Bros., Millbury, Mass.	33
The Douglas Mfg. Co., 62 Reade, N. Y.	9
Coal, Miners of.	
Lehigh Valley Coal Co., 277 Conrail and Church, N. Y.	17
Pardee A. & Co., 111 Broadway, N. Y.	17
The Hoboken Coal Co., Jersey City, N. J.	17
Coal Vases.	
Sidney Shepard & Co., Buffalo, N. Y.	31
Coal Hooks, Manufacturers of.	
Eastbrook, Chas. & Co., Cherry, Phila.	27
Coffee and Spice Mills.	
Lane Brothers, Millbrook, N. Y.	6
Enterprise Mfg. Co., Philadelphia, Pa.	16
Coal Chain.	
Union Chain and Cable Co., Pittsburgh, Pa.	5
Compensates and Dividers, Manufacturers of.	
Bemis & Callahan, Mfg. Co., Springfield, Mass.	12
Compound.	
Hornbush Chas., 56 Broadway, N. Y.	12
Cooper's Tools.	
D. R. Barton Tool Co., Rochester, N. Y.	13
Corn Shellers.	
Rumsey & Co., Seneca Falls, N. Y.	7
Corrugated Iron.	
Moseley Iron Bridge and Roof Co., 5 Day, N. Y.	5
Cotton Gin Feeders, Manufacturers of.	
The Brown Cotton Gin Co., New London, Conn.	34
Coverings, Manufacturers of.	
Wile, S. L. & Co., 709 Market, Phila.	35
Curry Combs, Manufacturers of.	
Cassell L. S., 201 N. Y.	28
Hortchieson Sons, Bridgeport, Conn.	28
Lawrence Corb Comb Co., 382 2d Avenue, N. Y.	28
Cutlery, Importers of.	
Baker Hermann & Co., 101 Duane, N. Y.	33
Clatworthy F. & W., 82 Chambers, N. Y.	33
Chas. J. S., 41 Commerce, Phila.	19
Friedmann & Lutterman, 14 Warren, N. Y.	19
Kmz. Hirsch & Co., 61 Chambers, N. Y.	19
Irvine A. C., 14 Murray, N. Y.	19
Spencer & Rogers, St. Louis, Mo.	19
Cutlery, Manufacturers of.	
American Shear Co., Hotchkissville, Conn.	19
Burman's Aaron, Penfield, Mass.	19
John Russell Cutlery Co., 101 Duane, N. Y.	19
Miller Bros. Cutlery Co., W. Meriden, Conn.	19
Naugatuck Cutlery Co., 99 Chambers, N. Y.	19
New York Knife Co., 14 Warren, N. Y.	19
Davis & Campbell, 220 N. Second, Phila.	19
The Lamson & Goodnow Mfg. Co., 38 Chittenden, N. Y.	19
Door and Gate Springs.	
Quackenbush, Townsend & Co., 50 Reade, N. Y.	34
Van Wagner & Co., 80 Chambers, N. Y.	34
Dredging and Makers of Dredging Machines.	
Am. Dredging Co., 19 S. Delaware ave., Phila.	19
Drill Chucks.	
Fraser & Co., 21 Chittenden, N. Y.	19
Drill Machines, Makers of.	
Forrest & Co., Philadelphia.	19
Drum Forging.	
Billings & Spencer Co., Hartford, Conn.	37
Baker Hermann & Co., 101 and 103 Duane, N. Y.	37
Hammond H. & Co., Hartford, Conn.	37
Drum Presses.	
Pick Mfg. New Haven, Conn.	12
Edge Tools.	
The D. R. Barton Tool Co., Rochester, N. Y.	13
Doscher M. & J. & Co., N. Y.	13
Electro-Plating.	
Embout & Catlin, 43 Gold, N. Y.	27
Elevating and Conveying Machines.	
Fitzhugh J. L., 101 N. Y.	18
Elevators, Makers of.	
Crane Bros. Mfg. Co., Chicago, Ill.	9
Holake Machine Co., 279 Cherry, N. Y.	9
Emery.	
De Baun H. G., 129 William, N. Y.	36
Geo. H. Gray & Danforth, Boston, Mass.	31
Enamelled Pipes.	
Lefferts Enamel Works, 417 W. 34, N. Y.	4
Engineers, Machinists, etc.	
Foot & McNulty, 24 Pearl, N. Y.	5
Hessell James, 106 Beach, Phila.	29
Moore James & Co., 149 and 151 Broadway, Phila.	29
Enslaves.	
Austin J. & Co., 105 Fulton, N. Y.	28
Dunton A. L. & Co., 218 N. 4th, Philadelphia.	28
Ervin Chas. W. & Co., Kensington, Phila.	28
Fales Thomas J., 18 Park Place, N. Y.	28
Hartford Foundry and Machine Co., Hartford, Conn.	36
Lovegrove & Co., 135 South 4th, Phila.	36
Payne B. W. & Sons, Corning, N. Y.	36
Shanley & Wells, Binghamton, N. Y.	36
Enginners.	
Collins, Geo. B. 10 Warren, N. Y.	25

McNab & Harlin Mfg. Co., 56 John, N. Y.	16
Faucets, Self-Measuring, Makers of.	
Enterprise Mfg. Co., of Pa., Phila. and N. Y.	34
Feed Cutters.	
Silver & Deming Mfg. Co., Salem, O.	36
Filles, Importers of.	
Clark J. & Riley, 82 John, N. Y.	27
Fisher Joseph S., 41 Commerce, Phila.	19
Fraser Peter A. & Co., 50 Fulton, N. Y.	32
Moore W. W. & John, N. Y.	32
Sanderson Bros. & Co., 135 Cliff, N. Y.	32
Fires, Manufacturers of.	
Adams Fire Works, Providence, R. I.	13
American Fire Co., Pawtucket, R. I.	13
Aurora Fire Works, 32 Chambers, N. Y.	8
Barnett G. & H. A. and 35 Richmond, Phila.	6
Diston Henry & Sons, Phila.	29
Draper T. & Co., 135 Cliff, N. Y.	8
Heller & Bros., Newark, N. J.	8
Hicks Fire Mfg. Co., West Chester, Mass.	8
Johnson & Bro., 1 Commercial, Newark, N. J.	8
Johnston & Bro., 1 Commercial, Newark, N. J.	8
McClaffey & Bro., 135 and 137 N. 4th, Phila.	8
Nicholson Fire Co., Providence, R. I.	8
Paul Chas. B., Williamsburg, N. Y.	8
Rothery John & Wm., Matamoras, N. Y.	8
Fire Brick, Makers of.	
Brooklyn Clay Refractory and Fire Brick Works, Van Dyke St., Brooklyn, N. Y.	28
Hall A. & Sons, Perth Amboy, N. J.	28
Hall A. & Sons, Buffalo, N. Y.	28
Maurer Henry, 418 East 23d, N. Y.	28
Kreischer H. & Son, 58 Goreck, N. Y.	28
Whitcomb, Albany, N. Y.	28
Ostrander James & Son, Troy, N. Y.	28
Valentine M. D. & Bro., Woodbridge, N. J.	28
Wentworth John R., Perth Amboy, N. J.	28
Werner Adam, 103 E. 14th, N. Y.	28
Woodland Fire Brick Co., Woodland, Pa.	28
Flint and Emery Paper and Cloth.	
Deer, Adams & Co., 780 Market, Phila.	4
Fluting Machines.	
Sauerb's Sons, H. Newark, N. J.	28
Forges, Portable, etc.	
Keystone Portable Forge Co., Philadelphia.	31
Foundries and Machinists.	
Sam J. Crosswell Jr., 812 Race, Phila., Pa.	6
Foundry Kettles.	
Cutter & Brown, 258 Cherry, N. Y.	4
Paterson J. W. & Co., 511 Beach, Phila.	4
Whitcomb, Albany, N. Y.	4
Furnaces, Makers of.	
Richmond & Fort, 119 S. Fourth, Phila., Pa.	5
Gas Stoves.	
Uhl Steltz, N. Y. G. 188 Grand, N. Y.	38
Glass Signs.	
Behr Herman & Co., 261 Pearl, N. Y.	38
Governors.	
Junius Jackson & Son, Rochester, N. Y.	38
Grate Bars.	
Vanderbilt Geo., foot W. 19, N. Y.	38
Grates and Griddles.	
Samuel & Birge Mfg. Co., St. Louis, Mo.	38
Grindstones.	
Celluloid Emery Wheel Co., Newark, N. J.	38
Wood Walter R., 283 and 285 Front, N. Y.	38
Worthington & Sons, North Amherst, O.	38
Guns, etc.	
Moore's John P. Sons, 300 Broadway, N. Y.	6
Windmiller Louis & Roelker, 20 Reade, N. Y.	30
Gunpowder, Makers of.	
Kneeland F. L. (Duport), 70 Wall, N. Y.	32
Lath and Band Powder Co., 21 Park Row, N. Y.	32
Hammers, etc., Manufacturers of.	
Hammond H., Hartford, Conn.	36
Harvey H. H., Augusta, Me.	36
Handies, Makers of.	
N. Carolina Handle Co., 79 Reade, N. Y.	36
Hardware Commission Merchants.	
Walbridge G. B. & Co., 13 Chambers, N. Y.	34
Walton, Conlter & Flaxler, 83 Chambers, N. Y.	34
Hardware Dealers.	
Barker W. C. & Co., Chicago.	12
Brown John I. & Son, 288 Greenwich, N. Y.	12
Lloyd, Supple & Mfg. Co., 59 Beekman, N. Y.	12
Prouty Hardware & Mfg. Co., 50 Reade, N. Y.	12
Quackenbush, Townsend & Co., 50 Reade, N. Y.	12
Shepard Sidney & Co., Buffalo, N. Y.	12
Hardware Importers.	
Baker Hermann & Co., 101 Duane, N. Y.	32
King, Blag & Co., 30 Chambers, N. Y.	32
Van Wagoner & Williams, 82 Beekman, N. Y.	32
Harold H. W., 78 Chambers, N. Y.	32
Windmiller Louis & Roelker, 20 Reade, N. Y.	32
Hardware Manufacturers.	
American Spring Bolt Co., 82 Beekman, N. Y.	40
Black Bros. Hardware Co., New Haven, Conn.	40
Bright Philip S., 25 Reade, N. Y.	40
Cowles Hardware Co., Unionville, Ct.	40
Enterprise Mfg. Co., Phila.	16
Miller's Falls Mfg. Co., 14 Chambers, N. Y.	25
Parr Geo., Buffalo, N. Y.	25
Peet G. Webster, 110 Chambers, N. Y.	25
Perin & Gaff Mfg. Co., Cincinnati, O.	25
Pratt & Co., Buffalo, N. Y.	25
Providence Tool Co., Providence, R. I.	10
Russell & Erwin Mfg. Co., New York.	10
Union Mfg. Co., Chambers, N. Y.	40
Van Wagner & Williams, 82 Beekman, N. Y.	40
Wilson Mfg. Co., 97 Chambers, N. Y.	40
Hardware Supplies.	
Edge W. C., 5 Maiden Lane, N. Y.	18
Grant & Co., Newark, N. J.	31
Hardy & Co., 109 Elm, N. Y.	31
Jessup & Sterling, 1 and 9 Cliff, N. Y.	12
Perin & Gaff Mfg. Co., Cincinnati, O.	12
Post C. C., Burlington, N. Y.	12
Samuel & Birge Mfg. Co., St. Louis, Mo.	12
Shepard Sidney & Co., Buffalo, N. Y.	12
Spencer & Underhill, 54 Beekman, N. Y.	12
Hinges.	
Lewis, Oliver & Phillips, Pittsburgh, Pa.	13
Horns.	
Hicks O. H. & Co., Baltimore, Md.	36
Housing Engines, Makers of.	
Crane Bros. Mfg. Co., Chicago, Ill.	9
Horse Nails, Makers of.	
Assable Horse Nail Co., 35 Chambers, N. Y.	18
Globe Nail Co., Boston, Mass.	18
Nail Co. Horse Nail Co., 35 Chambers, N. Y.	18
Northwestern Horse Nail Co., Chicago, Ill.	18
Pratt & Co., Buffalo, N. Y.	31
Potomac S. & Co., 100 Chambers, N. Y.	31
The Fowler Nail Co., Seymour, Conn.	31
Horse Shoes, Makers of.	
Boston Rolling Mills, 17 Batterymarch, Boston.	4
Burden Iron Works, Troy, N. Y.	4
Rhode Island Horse Shoe Co., Providence, R. I.	4
Schoenberger & Co., Pittsburgh, Pa.	4
Hydraulic Jacks.	
Dodgeon Richard, 31 Columbia, N. Y.	36
Lyon E., 40 Grand, N. Y.	36
Ice Chisels.	
Holden E. J. & Co., 34 Beekman, N. Y.	36
Iron Chisels.	
Gunsling Thos., Troy, N. Y.	36
Insurance, Boiler.	
Hartford Steam Boiler Inspection and Insurance Co.	39
Iron Brokers.	
Boydton Geo. A., 70 Wall, N. Y.	4
Crane T. O., 104 John, N. Y.	4
Hunter A. G., Pittsburgh, Pa.	4
Hazard T. D., 201 Pearl, N. Y.	4
Iron Bridges.	
Leitchman Bridge and Iron Works, Rochester, N. Y.	25
Iron (Castings).	
Spencer's Sons, L. S., Guilford, Conn.	2
Iron Chains.	
Quincy John W., 38 William, N. Y.	4
Iron Commission Merchants.	
Brown T. H., 20 W. 1st, N. Y.	4
Hand Jas. C. & Co., 614 and 616 Market, Phila.	4
Irvine A. C., 14 Murray, N. Y.	4
Spencer & Rogers, St. Louis, Mo.	4
Iron Flg. Buffers.	
Low S. B., Chattanooga, Tenn.	4
Williamson James & Co., 69 Wall, N. Y.	4
Iron Forges.	
Abel Brothers, 190 South, N. Y.	4
Bonnett, Rotterdam & Co., Youngstown, O.	4
Forrest & Co., 101 Duane, N. Y.	4
Brady Matthew, 4 Bridge, Brooklyn, N. Y.	4
Cleveland, Brown & Co., Cleveland, O.	4
Conney Daniel & Co., 101 Duane, N. Y.	4
Fuller, Lord & Co., 139 Greenwich, N. Y.	4
Harrison & Gilson, 326 to 352 Water, N. Y.	4
Hand Jas. C. & Co., 614 and 616 Market, Phila.	4
Judson B. F., 47 and 49 Water, N. Y.	4
Ogden Wallace, 35 to 57 and 59 Elm, N. Y.	4
Quincy John W., 38 William, N. Y.	4
Reed John H., 38 William, N. Y.	4
Spencer A. B., 38 William, N. Y.	4
Spencer A. B., 38 William, N. Y.	4
Wallace Wm. H. & Co., Albany and Washington	4
Wm. H. & Co., Albany and Washington	4
Wm. H. & Co., Albany and Washington	4
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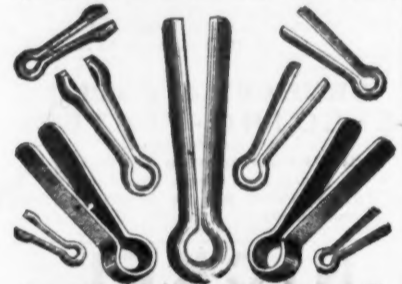
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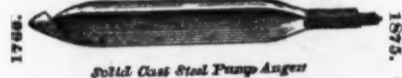
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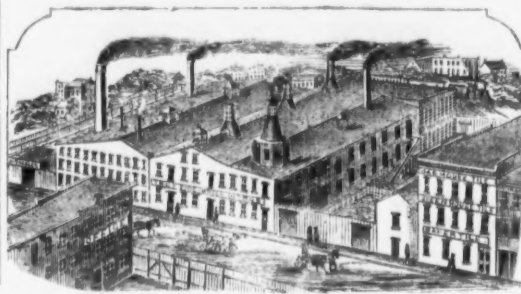
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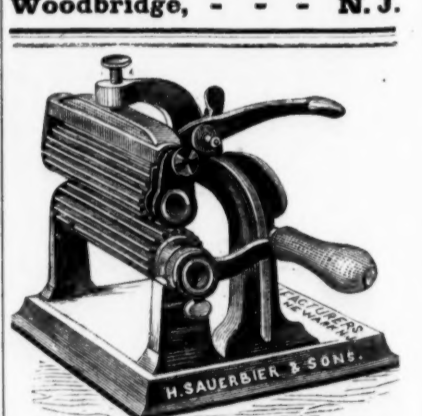
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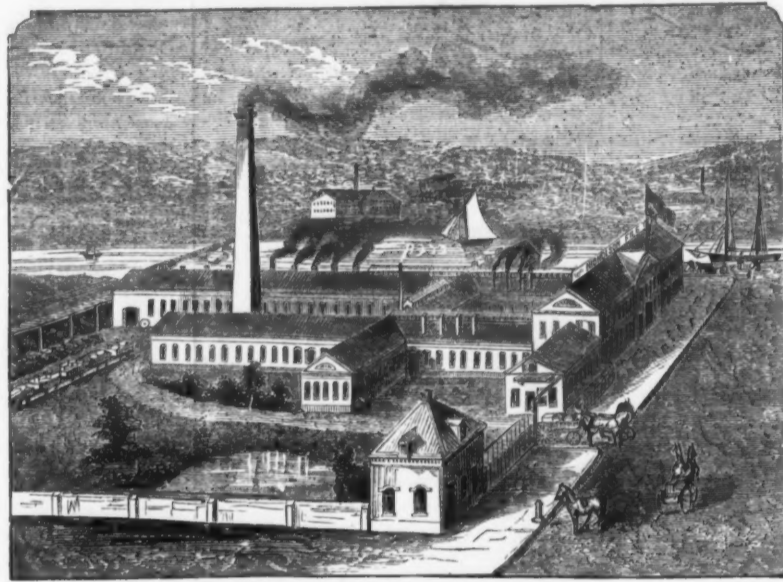
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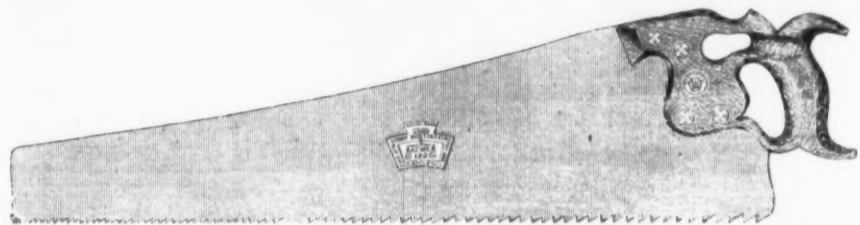
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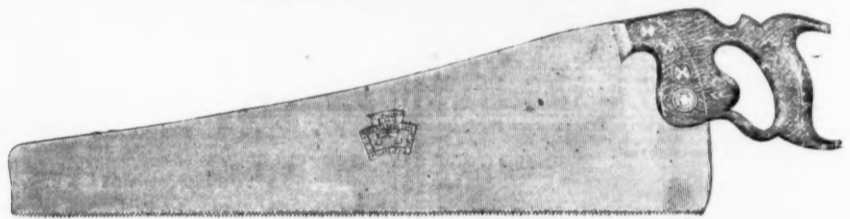
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Patent Double Grip Skew Back Saw.



Patent Skew Back "Choice," No. 80.



Patent Skew Back, No. 76.



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Patent Improved Combination Saw.



Patent Gauge Saw, Quality No. 7.

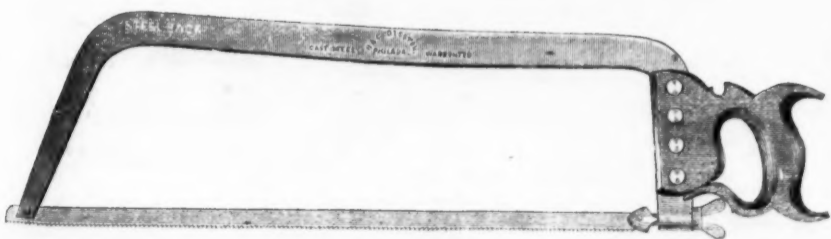


Patent Combination Saw, No. 29.

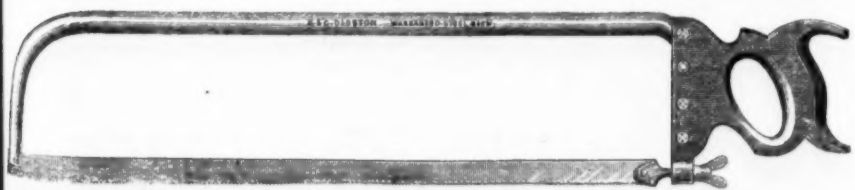


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BUTCHERS' BOW BACK SAWS.



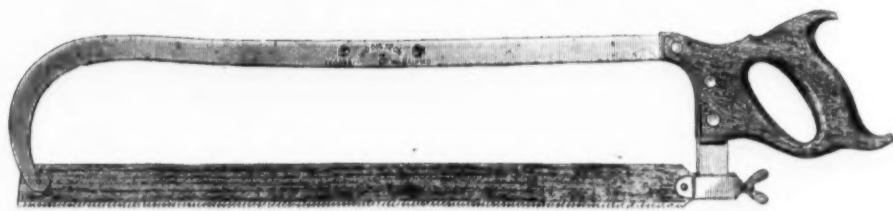
No. 1, California Flat Steel Back, Clock Spring Blades.



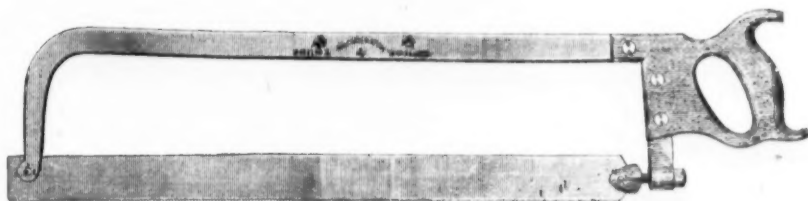
No. 2, California Oval Steel Back. Sizes, 16 to 24 inches.



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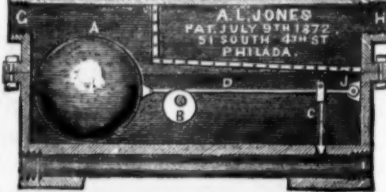
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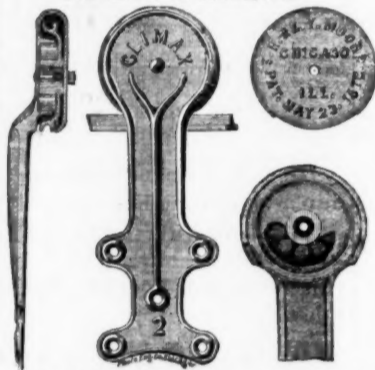
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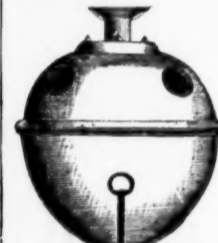
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Of various sizes and patterns, suited to every variety of Mechanical use. New Albany, Ind.

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Manufactures of

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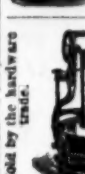
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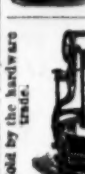
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Warranted thoroughly made

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Bemis & Call Hardware & Tool Co.
PATENT COMBINATION WRENCH.

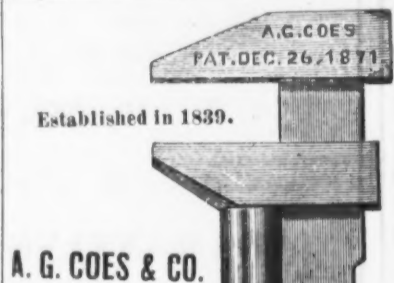
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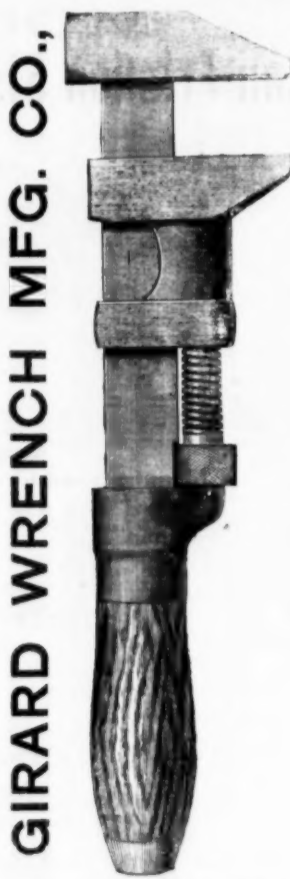
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NEW PATENT
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Which cannot be forced back into the handle.
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This Wrench is presented to the trade with full confidence that it is equal in all respects to any heretofore manufactured, and we fully guarantee our goods in every respect.
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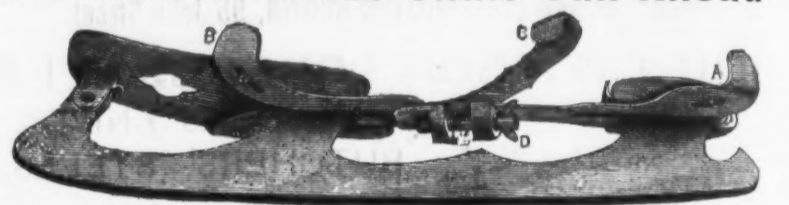
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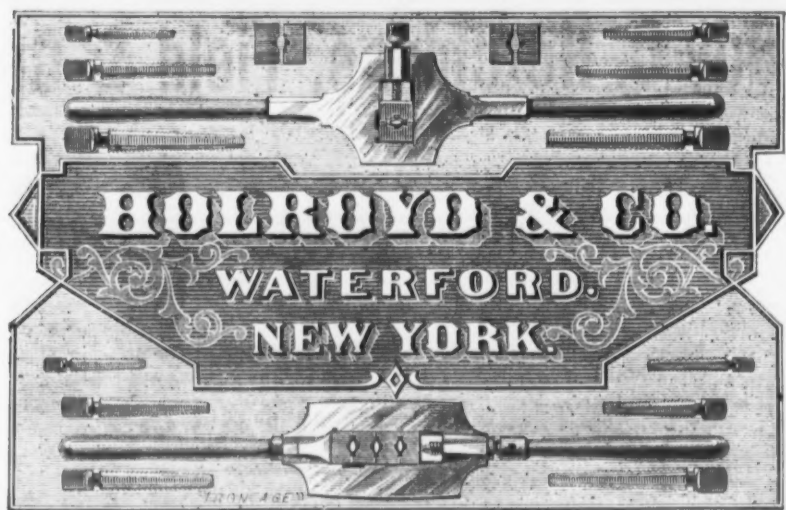
The Buell Peg Float

AND THE

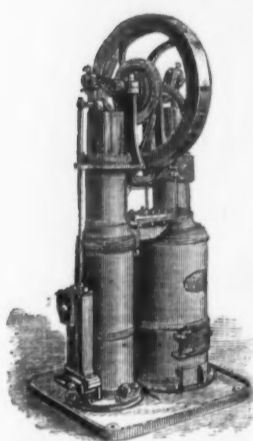
Little Giant Tack Puller.

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NO DANGER.**
Uses air as a Motive Power.
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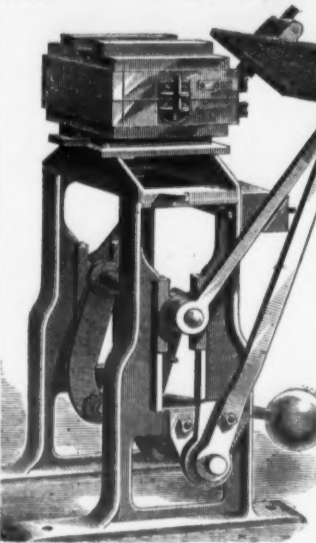
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T. F. HAMMER'S PATENT.

Beside all advantages Molding Machines possess over
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It requires no special flasks or boards but the same
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It occupies no more room than a bench for hand
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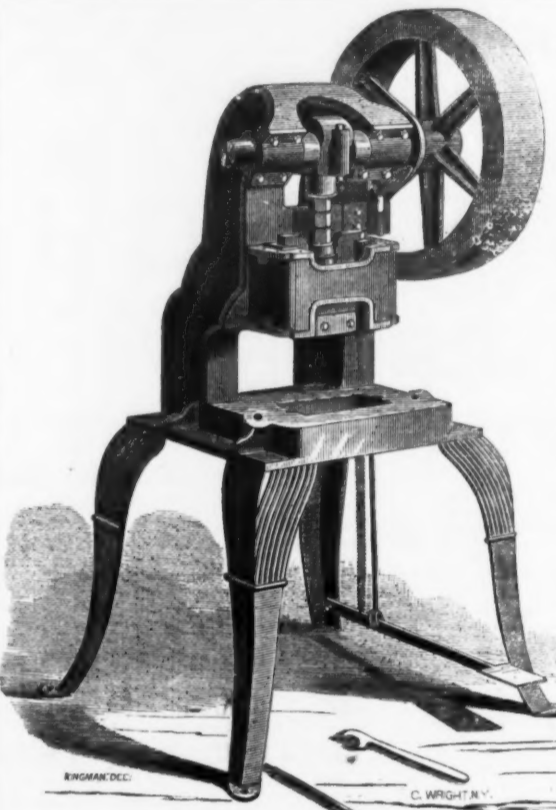
It produces at less cost more, smoother and uni-
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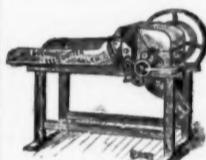
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Liberal discounts to the trade.

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Has Won Golden Opinions from the Mechanical World during the four
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It Has More Good Points, Less Complication, More Adaptability,
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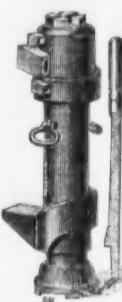
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Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order

HYDRAULIC JACKS



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For

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We invite attention to the superior con-
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strong, compact and
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MANUFACTURED BY

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For dimensions of Governor, see Illustrated Price List.



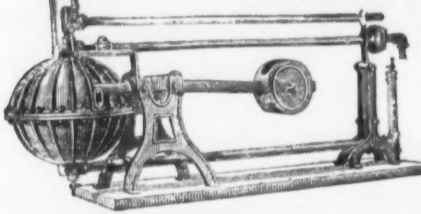
THE JUDSON PATENT Improved Steam Governor.

Size, Inch.	Plain.	Bright Fin. Isbed.	Extra for Lever.	Stop Valve.
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1 1/2	19.00	21.00	1.00	..
2	21.00	24.00	2.00	\$5.00
2 1/2	25.00	28.00	2.25	6.00
3	29.00	33.00	2.50	8.00
3 1/2	35.00	40.00	3.75	10.00
4	42.00	48.00	3.25	14.00
4 1/2	45.00	51.00	3.50	15.00
5	49.00	56.00	3.75	17.00
5 1/2	55.00	63.00	4.25	20.00
6	64.00	73.00	4.50	25.00
6 1/2	74.00	84.00	5.00	30.00
7	86.00	97.00	5.50	36.00
8	94.00	106.00	6.00	42.00
8 1/2	119.00	125.00	6.50	48.00
9	125.00	138.00	7.00	54.00
10	150.00	165.00	8.00	68.00
12	185.00	202.00	9.00	80.00
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No Charge for Boxing & Cartage.

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The Albany Steam Trap.



This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

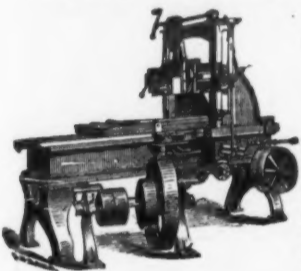
Albany Steam Trap Company, Albany, N. Y.

The Pratt & Whitney Co.,

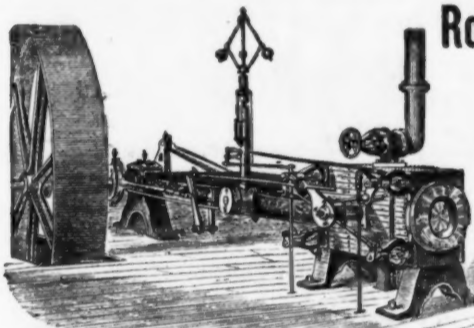
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Have constantly on hand and making

Drop Hammers



Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



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PORTABLE DRILLS. Driven by power in any direction. RADIAL DRILLS. Self-feed—Large Adjustable Box Table. VERTICAL DRILLS. Self-feed. MULTIPLE DRILLS. 2 to 20 Spindles. HORIZONTAL BORING AND DRILLING MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS. For Special Work.

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For Shafting, Axles, Tubes, Rails, &c.

There has long been a want of some device by which the straightening of shafting could be done without removing the work from the centers, and at the same time do it quickly and accurately. The

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meets just such a want: the apparatus is light and can be easily handled, yet it is of sufficient strength for the purpose required. It can be placed upon the shears of the lathe, and moved along the entire length of the work. It is especially

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STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength

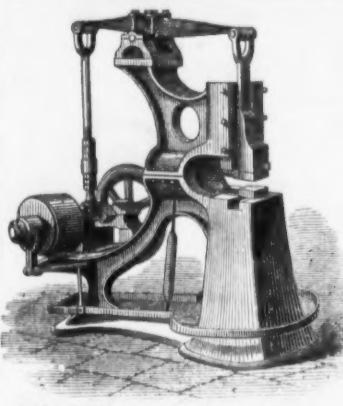


For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

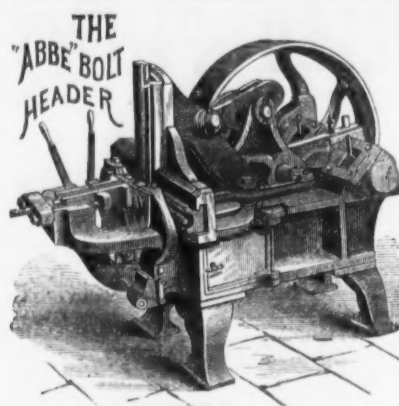
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Also for crushing Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barites, Manganese, Phosphate Rock, Plaster, Soapstone, &c. For Illustrated Circulars, and particulars, address,

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THE PALMER POWER SPRING HAMMER.



Of these Machines we are building sizes to meet the requirements of all Manufacturers and Workers of Iron and Steel. In simplicity, durability, ease of operation, accuracy, and range of work, we guarantee them superior to any Machines of their kind produced in the world. For prices, references, and full descriptive circulars, address

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Manchester, N. H.

Knowles Patent Steam Pumps

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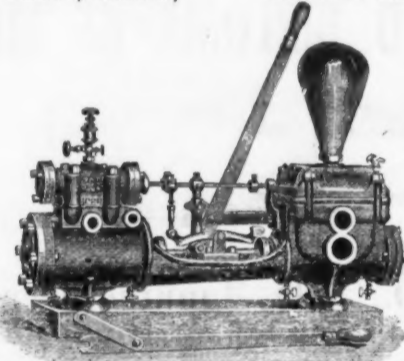
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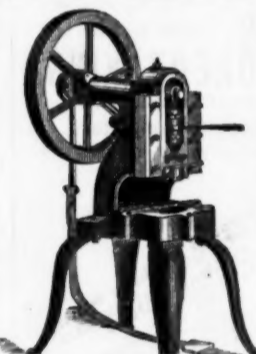
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Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

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Mining Pumps (both Double Acting Plunger, and Piston Pattern), which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best. Every machine furnished under a complete guarantee.



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I warrant every part of this Machine to stand the shock of the wheel running at 125 revolutions.

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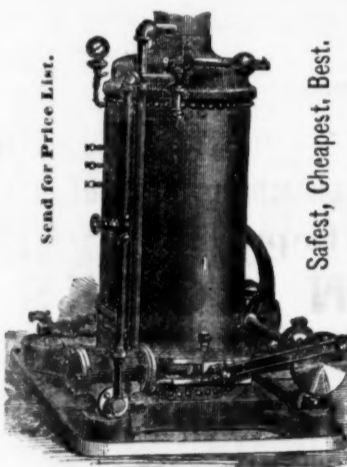
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FOR DENTAL AND MANUFACTURING PURPOSES.

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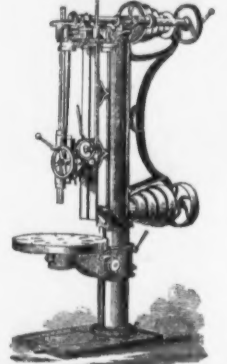
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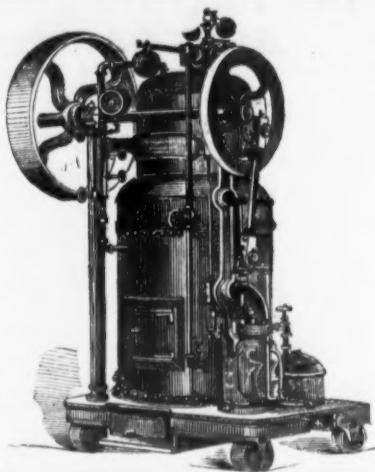
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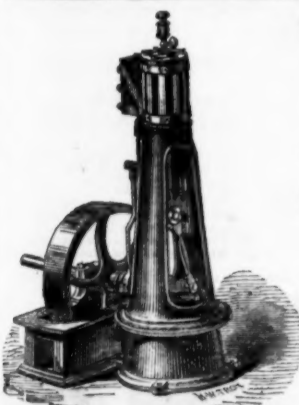
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Special Machinery
BUILT TO ORDER.Vertical and Horizontal Engines, of New
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COSTS LESSAnd is equal to any Engine in the market.
ALL WORKING PARTS WELL FINISHED.No. 1, Cylinder 4x6.....\$125.00
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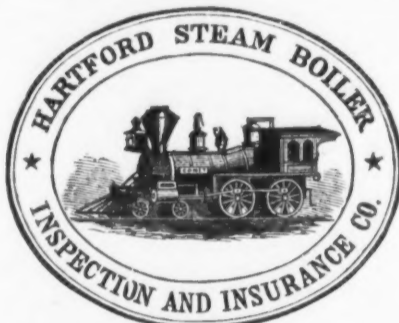
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The Business of the Company includes all kinds of STEAM BOILERS

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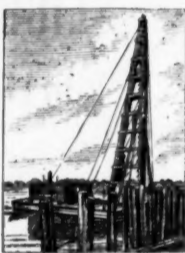
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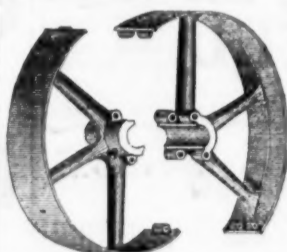
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Offices, No. 10 South Delaware Ave., Philad'a.

Split Pulleys & Split
CollarsOf same price, strength and appearance
as WHOLE PULLEYS and
WHOLE COLLARS.YOCOM & SON,
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Drills for Coes, Worcester, Hunter and other Hand Drill;
Presses, Beach's Patent Self-Centering Chucks, Center
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Drill Grinding Machines. Taper Reamers.
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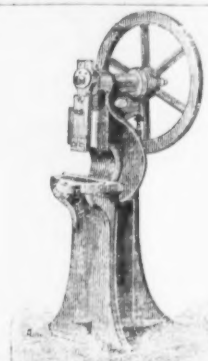
All Tools exact to Whitworth Standard Gauges.

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Machinery, &c.



REPORT OF JUDGES

In Department V, Group 3, at the 44th

Exhibition of the

AMERICAN INSTITUTE.

Held in the City of New York, Oct., 1875

No. 318, Drawing, Drop &
Punching Presses.THE STILES & PARKER PRESS CO.,
Of Middletown, Conn.The machinery exhibited by these makers is of a
character that calls for special commendation. In
addition to their well known punch and presses, to
which a new feature has been added in a press ad-
justable to an inclination for discharging work left
above the die, there are exhibited by them a com-
bined punch and shears, a drawing or blanking press,
and a drop.In all these there is shown the highest mechanical
culture, applied to meet every practical requirement,
to avoid every practical difficulty, and to enlarge the
range of application of the machines, by devices
which are at once simple, elegant, and effective.Your committee would unanimously recommend
for this exhibition the "Medal of Progress," but
find such award debarred by the rule of the Institute,
forbidding such award unless a Silver Medal has
been previously awarded. We, therefore, respect-
fully recommend the award of a Silver Medal.

Silver Medal Awarded.

A true copy from the Report on file.

JOHN W. CHAMBERS, Sec'y.

AQUOMETER
Steam Pump.

Highest Premium awarded by

Franklin Institute, 1874.

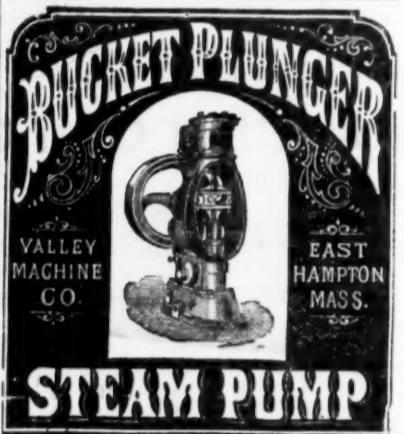
For Simplicity, Economy of

Construction & Efficiency.

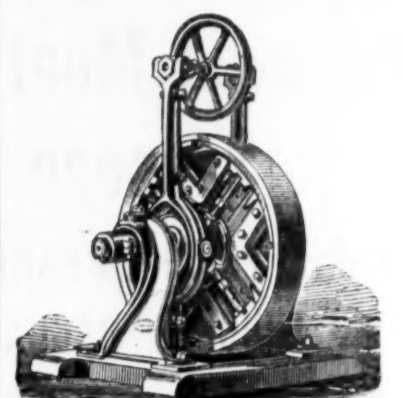
An absolutely Durable, Cheap, Efficient and Eco-
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AQUOMETER STEAM PUMP CO.

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EUREKA SAFETY POWER!

Practically impossible to
explode. Tested to 30 lbs
pressure per square inch. Will
slit a inch seasoned oak--grind
bushels corn per hour. Price
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cular. Discount to the trade.B. W. PAYNE & SONS,
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FRICTION PULLEYS

Friction Clutches

For Connecting Shafting and Gearing.

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Lafayette Street, PROVIDENCE, R. I.

TUBAL SMELTING WORKS, 760 South Broad Street, PHILADELPHIA. PAUL S. REEVES, MANUFACTURER OF ANTI-FRICTION METALS.

XXX Genuine.....	40c	C.....	30c
XX.....	35c	D.....	25c
X.....	30c	E.....	20c
A.....	25c	F.....	15c
B.....	20c		

"Note."—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

BRASS CASTINGS, 21 to 35c. INGOT BRASS, 19 to 25c. BRASS TURNINGS AND OLD METALS WANTED.

ESTABLISHED 1842.

WM. & HARVEY ROWLAND PHILADELPHIA,

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Elliptic, Platform & C Springs,

MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

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CAST SPRING AND PLOW STEEL.
CAST SHOVEL, HOE AND MACHINERY STEEL.OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.
BESSEMER SHOVEL AND PLOW STEEL.
BESSEMER MACHINERY AND CULTIVATOR STEEL.RE-ROLLED NORWAY SHAPES.
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

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Prize Medal and Diploma.

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PERRY'S

Improved Meat Cutters and Sausage Fillers,

STORE TRUCKS, BARREL TRUCKS, BAG
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A Substitute for Steel and Wrought Forgings.
Circulars sent on application.

Steel Castings

We make Steel Castings true to pattern, sound and strong. Can be worked same as bar steel. Plow-shares, Mold-boards and Land-sides, Anthracite Coal-breaker Teeth, Wheels and Pinions, Dies and Hammer Heads, Engine and Machinery Castings of all descriptions, Railroad Frogs and Crossings.

Invaluable for all articles requiring great strength and durability.
Send for Circular.

PITTSBURGH STEEL CASTING CO.,
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Crucible Steel Castings

Light and Heavy STEEL CASTINGS of superior quality made on short notice, true to pattern, solid, strong and durable, can be readily forged and tempered.

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Established 1825.

PHILLIPS, NIMICK & CO.
The only Manufacturers of
"Sligo" Fire Box Iron, Boiler Plate,
Sheet and Bar Iron,

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"Tyrone" Brand of Bar, Tank & Sheet
Iron, Girder and Ship Plates, Angle
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Plates Rolled 100 inches wide.
OFFICE AND MILLS,
South Side, Pittsburgh, Pa.

By Bolt Iron, Warranted Unexcelled.
R HEADS & FLUE HOLES
FLANGED TO ORDER.
Quality our Specialty.

UNIFORM SPEED

WARRANTED THE MOST PERFECT GOVERNOR IN THE WORLD

However great or violent may be the change of load we will warrant any positive uniform speed of engine desired.
ADDRESS: HUNTON GOVERNOR CO., LAWRENCE, MASS.

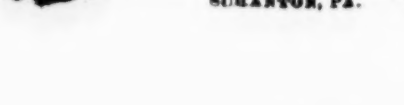
HARDY & CO., Manufacturers of Police & Fire Department SUPPLIES.

Brass, German Silver & Leather Dog Collars.
102 ELM STREET, NEW YORK.



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E. A. BETTS, WILMINGTON, DEL.
SOLE MAKERS. SEND FOR CIRCULAR.

SCRANTON Brass Works, J. M. EVERHART, Manufacturer of Brass Work for Water, Gas and Steam. Brass Castings and Jobbing promptly attended SCRANTON, PA.



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We respectfully submit the following recommendations, of many received:
WILLIAMSPORT FURNITURE MANUFACTURING CO., WILLIAMSPORT, Pa., Feb. 26, 1875.
Messrs. Du Plaine & Co.: Gentlemen—Having had over two years' experience with your XXX Babbitt Metal, it is with great pleasure we recommend it. It is most decidedly the Best and Cheapest Metal we have ever used, from its great saving in labor, oil and vexatious and expensive delays; as it is less liable to become hot, and wears twice as long as any other metal we have ever used. Yours, truly,
F. MANKEY, Sup't Mechanical Dept. (Signed) D. B. HUBBARD, President.

OFFICE A. WILT & SON,
Door, Sash, Shutter, Window Frame and Molding Manufactory, General Wood Working Mills,
Nos. 711, 713, 715, 717, 719, 721, 723 N. Front Street, PHILADELPHIA, PA.
Messrs. Du Plaine & Co.: Gentlemen—After using your Babbitt Metals for a very long time, and giving them a thorough trial, they have proved a satisfactory test. We are convinced that it is the Best Metal we have ever used, and as such we recommend it to the notice of all. We do not intend being without a supply, as we find it has become a necessity to us. Truly yours,
A. WILT & SON.

THOMAS WOOD, LEWIS A. LUKENS, ALAN WOOD & CO., Manufacturers of Sheet and Plate Iron,
ALAN WOOD, JR., CHARLES LUKENS, SCHUTTKILL IRON WORKS,
HORATIO WOOD, JAWOOD LUKENS, CONSHOBOKEN, 16th mo., 10th, 1876.
Messrs. Du Plaine & Co.: Gentlemen—In reply to yours of yesterday, we take great pleasure in saying that your Babbitt Metals have always given us entire satisfaction. We constantly subject it to the heaviest mill work, and never find it wanting in all that is required of it. Very truly yours,
ALAN WOOD & CO.

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Messrs. Du Plaine & Co.: After using your XXX and other Babbitt Metals for over two years, and giving them a severe and thorough trial, they have proved a very satisfactory test, and I am convinced that they are the Best Metals we have ever used, and so recommend them. Yours, truly,
JOHN E. REEF, Master Mechanic and Superintendent.

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Carriage, Tire, Plow, Stove,
AND OTHER

BOLTS.

Carriage Bolts made from Best Square Iron, a Specialty.

THE BURNING OF THE BROOKLYN THEATRE.

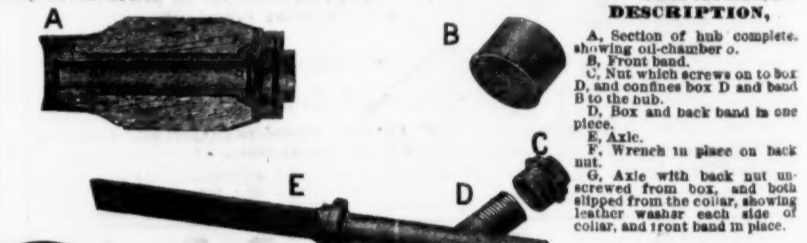
"Many who were in the parquet and dress circle may owe the preservation of their lives to the fact that the doors opened freely 'in and out, on what are known as double acting hinges.'"—N. Y. TRIBUNE, Dec. 8th, 1876.

The Hinges on the doors referred to, were the Double Acting Spring Hinges, manufactured by the American Spiral Spring Butt Co., 82 Beekman Street, New York.



HENDRY'S PATENT CARRIAGE AXLE.

Patented June 29, 1875.



Patented June 18, 1876.

DESCRIPTION.

A. Section of hub complete, showing oil-chamber.
B. Front band.
C. Nut which screws on to box D, and confines box D and band B to the hub.
D. Box and back band in one piece.
E. Axle.
F. Wrench in place on back nut.
G. Axle with back nut unscrewed from box, and both slipped from the collar, showing leather washer each side of collar, and front band in place.

Points of Excellence.

No oil can come in contact with the wood of the hub to loosen the spokes, or otherwise injure the wheel.
No oil can escape to deface the wheel and spoil the varnish.
No dirt, gravel or water can work in upon the axle.
It holds the wheel in a superior manner. It is easier to oil than a common axle. It is adapted to any kind of a wheel. It requires no wedging to box the wheel.

HENDRY'S PATENT THILL COUPLING SPRING.

Patented Oct. 8, 1876.

This useful invention meets a great want, and will be easily understood from the cut. The spring is made of Best Cast Steel tempered, and is adapted to any coupling where rubbers are used. It is neat in appearance, prevents oil rattling, is durable as steel, and costs but a trifle. Call for it at your nearest hardware dealers, or we will send set by mail, postage paid, on receipt of 25c. Manufactured by

BRIGHAM, LITCHFIELD & VINING,
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TACKS, BRADS, NAILS, &c.

All Tacks assorted by our new PATENT ASSORTER, which removes all dust and silvers and poor Tacks, so that the purchaser pays for nothing but perfect goods.
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BRASS FOUNDRY & METAL REFINING WORKS B. W. BALDWIN, Manufacturer of



Castings for Cars, Mills and Machinery. Also supplied in ingots to the trade. Guaranteed to be the safest and most durable Journall Metal made. M. B. STOTLER, Gen'l Manager. Office, near corner of 25th and K. Sts., Pittsburgh, Pa.